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DRAFT FINAL INTERIM-ACTION, SUMMARY ALTERNATIVE SELECTION REPORT, OPERABLE UNIT 2

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HARDING LAWSON ASSOCIATES

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DRAFT FINAL
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SUMMARY ALTERNATIVE SELECTION REPORT
NAVAL STATION TREASURE ISLAND
HUNTERS POINT ANNEX
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EXECUTIVE SUMMARY

This Summary Alternative Selection Report (ASR) presents the results of an evaluation of the need for an interim action at Operable Unit (OU) II, Hunters Point Annex (HPA), San Francisco, California (Plate 1). OU II, now referred to as Interim Action OU II, consists of the Tank Farm (Site IR-6), Polychlorinated Biphenyl (PCB) Spill Area (Site IR-8), the Pickling and Plate Yard (Site IR-9), and the Battery and Electroplating Shop (Site IR-10). This ASR is a component of the Remedial Investigation/Feasibility Study (RI/FS) for the HPA facility and presents information in support of any recommended interim actions.

Interim actions at HPA are considered appropriate when:

- Contamination related to point sources represents an imminent threat to human health, or
- The need for final remedial action is likely, and interim actions will expedite final remedial actions.

The need for and selection of interim actions at each Installation Restoration (IR) site are evaluated in three stages: (1) characterization of contamination related to point sources, (2) assessment of the risks to human health from exposure to these contaminants, and (3) definition of the interim action remedial units and the selection of recommended interim action alternatives. This ASR presents the results of these evaluations for Sites IR-6, IR-8, IR-9, and IR-10. A comprehensive evaluation of these sites will be made as part of parcel RI/FS activities, and will consider nonpoint-source-related chemicals, risks to environmental receptors, chemicals occurring at adjacent sites, and the most current information on future land use.

Geology and Hydrogeology

The geology of the OU II sites generally consists of Artificial Fill and Undifferentiated Upper Sand Deposits overlying Bay Mud Deposits, Undifferentiated Sedimentary Deposits, or Franciscan Bedrock. Aerial photographs indicate that fill was placed in San Francisco Bay sometime between 1935 and 1948; the majority of the fill was probably emplaced shortly after the Navy began ship production in 1941. Undifferentiated Upper Sand Deposits are generally absent where the bedrock surface is above mean sea level. The Franciscan Bedrock, the apparent source of most of the artificial fill materials at HPA, consists primarily of serpentinite, argillite, and siltstone, and contains elevated levels of various heavy metals.

Two aquifers have been identified at the OU II sites. The uppermost or A-aquifer generally consists of saturated Artificial Fill and Undifferentiated Upper Sand Deposits and localized areas of Undifferentiated Sedimentary Deposits. The A-aquifer is observed at all OU II sites and has groundwater levels between 4 and 8 feet below ground surface. The upper part of the Franciscan Bedrock, which consists of weathered serpentinite, has been designated the Bedrock Aquifer at Sites IR-6 and IR-10. Groundwater flow in the A-aquifer is generally toward San Francisco Bay at OU II sites.

Site Histories, Conditions, and Point-Source-Related Contamination

Site IR-8

Site IR-8 is a PCB spill area discovered in 1986 during repair of an underground utility line. A former transformer pad is the primary suspected source of the PCB spill. A soil and groundwater investigation and an interim soil removal were performed between 1987 and 1988.

The primary point-source-related contaminant observed in soil and groundwater at Site IR-8 is PCBs in the form of Aroclor 1260. Soil contamination was observed in small areas at low concentrations (less than 7.2 milligrams per kilogram [mg/kg]) near the former PCB spill area. The occurrence of point-source-related chemicals in groundwater at Site IR-8 is limited to the presence of Aroclor 1260 in groundwater at one monitoring well, at concentrations up to 4.4 micrograms per liter.

Site IR-9

Site IR-9, the Pickling and Plate Yard, was used for industrial metal finishing and painting from 1947 through 1973. Steel plates were dipped in acid tanks (pickling), dried on racks, and then painted with zinc chromate-based corrosion-resistant primer.

The primary point-source-related contaminant observed in soil and groundwater at Site IR-9 is hexavalent chromium. It was observed in soil and groundwater in two areas, one in the immediate area of the pickling tanks and associated containment vault and the other near shallow surface drainage lines in the southwest corner of the site.

Sites IR-6 and IR-10

The Tank Farm, Site IR-6, was used by the Navy until 1974 to store diesel fuel and lube oil for distribution through underground utility lines to shipping berths. A diesel spill reportedly occurred in the early 1940s from the rupture of a 286-barrel tank. The Battery and Electroplating Shop, Site IR-10, was used for electroplating and battery storage and maintenance from 1946 through 1974. Waste acids containing cyanide, chromates, and heavy metals were reportedly spilled on the floor and loading dock area and discharged into a floor drain system connected to a storm drain that discharged to San Francisco Bay.

The primary point-source-related contaminants observed in soil and groundwater at Sites IR-6 and IR-10 are volatile organic compounds (VOCs) such as benzene, toluene, ethylbenzene, and xylenes (BTEX) and chlorinated solvents, polycyclic aromatic hydrocarbons (PAHs), petroleum hydrocarbons (total petroleum hydrocarbons [TPH as diesel] and total oil and grease [TOG]), Aroclor 1260, and several metals. All of these contaminants were found at and near the Tank Farm. Chlorinated solvents were observed beneath and downgradient of the Battery and Electroplating Shop. BTEX compounds and chlorinated solvents are found in groundwater about 150 feet downgradient of the Tank Farm and about 200 feet downgradient of the Battery and Electroplating Shop. PAHs, TPH as diesel, TOG, and metals are found primarily near their apparent source, the Tank Farm.

Risk Assessment Methods

A baseline public health and environmental evaluation (PHEE) was performed as a component of the OU II RI/FS. The OU II PHEE was performed in accordance with EPA guidance on human health risk assessments, especially *Risk Assessment Guidance for Superfund*, known as RAGS (*EPA, 1989c*). The HPA facility is currently used for light industrial and commercial purposes. No current exposures to existing human receptors were evaluated for the OU II sites, because there are no permanent residents, workers, or other users (e.g., recreational) at these sites. In addition, over 90 percent of the area of the sites is paved or covered by buildings or other structures, and strict security controls prevent access to sites.

Hypothetical future exposures were evaluated because land uses at HPA may change in the future. After considering all possible human receptor populations, three were selected for evaluation:

- Construction workers who might build future residences or other structures on the sites
- Office workers who might work at the sites for up to 25 years
- Residents, including children, who might live at the sites for up to 30 years.

Inhalation, ingestion, and dermal contact exposures to soil and groundwater were quantified for each receptor population. Average and reasonable maximum exposure scenarios were developed for each pathway and receptor. Chemicals of concern in soil and groundwater were identified for each site and were used to quantify risks associated with the inhalation, ingestion, and dermal exposure pathways.

Risk Assessment Results

Ingestion and dermal contact with soil and groundwater are generally the most important exposure pathways for residents and office workers; the potential adverse health effects are predicted to be greater for residents, especially children. Inhalation of dust is the most important exposure pathway for future hypothetical construction workers.

The point-source-related chemicals of most concern for potential noncarcinogenic adverse health effects at OU II sites for the pathways and receptors evaluated are chromium VI and lead. The point-source-related chemicals of most concern with potential cancer risks are Aroclor 1260 in soil, vinyl chloride and other VOCs, arsenic, and chromium VI in groundwater, and carcinogenic PAHs (cPAHs) in both media.

In relative terms, the potential adverse health effects of exposures to chemicals in soil are greatest at Site IR-6. The magnitude of such effects is less at Sites IR-8, IR-9, and IR-10 and similar among these sites, although the sources differ. In relative terms, the potential adverse health effects of exposures to chemicals in groundwater are greater at Site IR-9 than at Site IR-6/IR-10. The groundwater at Site IR-8 is not potable.

<u>Development of Target Remedial Goals</u>

At each site, target remedial goals (TRGs) were developed for the point-source chemicals occurring at concentrations with the most significant potential adverse health effects. TRGs were used to identify the remedial units and to develop the remedial alternatives.

TRGs for soils were estimated on the following basis:

- Exposure of the most sensitive receptor (child resident) to the chemicals in surface soil (i.e., top 2 feet) via ingestion and dermal contact.
- Comparison of residual health effects to threshold levels for noncarcinogenic chemicals and the upper end of the EPA target risk range for carcinogenic chemicals.

TRGs for groundwater were based on a comparison of site-related chemical concentrations to available federal maximum contaminant level goals, maximum contaminant levels (MCLs), or total health-based levels as presented in the OU II PHEE report. Groundwater containing total dissolved solids (TDS) above the EPA criterion of 10,000 milligrams per liter was not considered for interim action.

TRGs for construction workers were not developed because it is expected that appropriate health and safety measures would be implemented during construction or remedial activities at the sites.

TRGs for petroleum fuels and oil and grease are also proposed for soil at sites IR-6 and IR-10. Proposed TRGs for TPH as diesel at OU II are 500 and 1,000 mg/kg for residential and commercial scenarios, respectively. These values are lower than levels proposed in the OU IV ASR because hydrocarbons occur at and below the water table at OU II, but occur above the water table at OU IV.

Definition of Remedial Units

In the FS, remedial units were defined at each IR site for soil and at Sites IR-9, IR-6, and IR-10 for groundwater. The lateral boundaries of the remedial units are defined by the occurrence of chemicals at concentrations above their respective TRGs. The soil remedial unit at the Tank Farm (Site IR-6) is up to 16 feet thick because soils down to this depth contain levels of petroleum products above TRGs. Other soil remedial units generally extend to 3 feet below ground surface, which includes the surface soil and a 1-foot safety margin. The groundwater remedial units encompass the entire thickness of the uppermost aquifer.

Interim Action Remedial Units

The soil and groundwater remedial units described in the OU II FS Report were considered for interim action against the following criteria:

- The contamination is associated with point sources from site-related activities
- The levels of contamination present do not comply with applicable or relevant and appropriate requirements such as MCLs
- Current site conditions pose an imminent threat to existing human receptors or a potential long-term threat to potential future users
- Data sufficient to design and implement remedial action are available and such an action would not exacerbate the problem or hinder future implementation of long-term action.
- Engineering and field considerations that may affect implementability, long-term effectiveness, cost, and reduction of toxicity, mobility, and volume.

Soil and groundwater at Sites IR-9 and IR-10 and soil at Site IR-8 did not meet the interim action criteria. Soil and groundwater at Site IR-6 met the interim action criteria. At Site IR-6, the lead, PCBs, and cPAHs in soil and VOCs and SOCs in groundwater are chemicals associated with suspected point sources that may pose human health risks to existing or possible future receptors under both residential or commercial uses of this site; potential risks are associated primarily with ingestion and dermal contact with soil. The presence of diesel fuel and oil and grease is also related to suspected point sources at Site IR-6. Therefore, interim action remedial units were identified for the soil and groundwater at Site IR-6.

The remedial alternatives presented in the OU II FS Report were reevaluated for the interim action remedial units for soil and groundwater at Site IR-6, on the basis of implementability, long-term effectiveness, and cost. The three interim action alternatives that best met the screening criteria for Site IR-6 soil were:

- No action/institutional action
- Onsite ex situ aerobic biodegradation of soil and collection and discharge of groundwater to the publicly owned treatment works (POTW)
- Onsite thermal desorption of soil and collection and discharge of groundwater to the POTW.

Of these options, aerobic biodegradation was chosen as the preferred soil remedial alternative because it is the least expensive and the easiest to implement of the action alternatives.

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LIST OF ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
ASR	Alternative Selection Report
ATSDR	Agency for Toxic Substances and Disease Registry
BAAQMD	Bay Area Air Quality Management District
bgs	Below Ground Surface
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
Cal-EPA	California Environmental Protection Agency
CCR	California Code of Regulations
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR	Code of Federal Regulations
CH&SC	California Health and Safety Code
CLEAN	Comprehensive Long-Term Environmental Action Navy
COC	Chemical of Concern
cPAH	Carcinogenic Polycyclic Aromatic Hydrocarbon
cy	Cubic Yard
DA	San Francisco District Attorney
1,2-DCE	1,2-Dichloroethene
DTSC	Cal-EPA Department of Toxic Substances Control
EPA	U.S. Environmental Protection Agency
ESAP	Environmental Sampling and Analysis Plan
FFA	Federal Facility Agreement
FS	Feasibility Study
HBL	Health-Based Level
HI	Hazard Index
HLA	Harding Lawson Associates
HPA	Hunters Point Annex
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
Navy	Department of the Navy
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPV	Net Present Value
O&M	Operation and Maintenance
OU	Operable Unit
PA	Preliminary Assessment
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene (Perchloroethene)
PHEE	Public Health and Environmental Evaluation
POTW	Publicly Owned Treatment Works
RAO	Remedial Action Objective
RI	Remedial Investigation
RME	Reasonable Maximum Exposure

LIST OF ACRONYMS
(continued)

ROD	Record of Decision
RWQCB	Regional Water Quality Control Board, San Francisco Bay Region
SAAQ	State Ambient Air Quality Standard
SACM	Superfund Accelerated Cleanup Model
SARA	Superfund Amendments and Reauthorization Act of 1986
SOC	Semivolatile Organic Compound
STU	Soil Treatment Unit
SUPSHIP	Navy Office of the Supervisor of Shipbuilding, Conversion, and Repair
TCA	1,1,1-Trichloroethane
TCE	Trichloroethene
TCLP	Toxicity Characteristic Leaching Procedure
TDS	Total Dissolved Solids
tHBL	Total Health-Based Level
TOG	Total Oil and Grease
TPH	Total Petroleum Hydrocarbons
TRG	Target Remedial Goal
VOC	Volatile Organic Compound
WRCB	Water Resources Control Board (California)
WESTDIV	Western Division (Navy)

1.0 INTRODUCTION

This Summary Alternative Selection Report (ASR) has been prepared by Harding Lawson Associates (HLA) to summarize the results of an evaluation of the need for interim action at Operable Unit (OU) II, Hunters Point Annex (HPA), San Francisco, California (Plate 1). This report was prepared under contract to PRC Environmental Management, Inc. (PRC), on behalf of the Department of the Navy (Navy), Western Division (WESTDIV), Naval Facilities Engineering Command, under Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract N62474-88-D-5086, Contract Task Order 196. It is a component of the Remedial Investigation/Feasibility Study (RI/FS) for the HPA facility.

This report summarizes the following draft documents:

- *Operable Unit II Remedial Investigation Report, Naval Station Treasure Island, Hunters Point Annex, San Francisco, California (HLA, 1992h).*
- *Operable Unit II Public Health and Environmental Evaluation Report, Naval Station Treasure Island, Hunters Point Annex, San Francisco, California (HLA, 1992k).*
- *Operable Unit II Feasibility Study Report, Naval Station Treasure Island, Hunters Point Annex, San Francisco, California (HLA, 1992l).*

The purpose of the FS was to identify the areas to be remediated (remedial units) and to propose suitable final remedial alternatives; however, while the RI/FS process was underway, the Navy and regulatory agencies recognized that final remedial alternatives could not be developed in the FS because of the following limitations:

- **Type of contamination** - Chemicals detected in soils and groundwater are from point and nonpoint sources. Point sources are related to waste management or disposal activities at a particular site. Chemicals from nonpoint sources either occur naturally in the soils or are present at the site due to human activities not related to a particular site.

- **Presence of uninvestigated sites** - The IR sites in OU II are bordered by other uninvestigated but potentially contaminated sites. Underground utilities such as storm drains, sanitary sewers, steam lines, and fuel distribution lines are also potential sources of contamination.

Because of these limitations, the FS report considered remedial actions that may not be final actions. As a result, the agencies and the Navy agreed to summarize the results of the FS, to identify remedial units for interim actions, and to recommend interim action alternatives in an Alternative Selection Report (ASR) in accordance with the EPA's Superfund Accelerated Cleanup Model (SACM) (*EPA, 1992a*). The ASR recommends a preferred interim action alternative for applicable sites.

This ASR presents information in support of interim action decision documents and is generally consistent with the U.S. Environmental Protection Agency's (EPA) *Outline of Engineering Evaluation/Cost Analysis (EE/CA) Guidelines*, *Guidance on Preparing Superfund Decision Documents*, and *Guide to Developing Superfund No Action, Interim Action, and Contingency Remedy RODs* (*EPA, 1988a, 1989b, 1991*).

1.1 Physical Description of Hunters Point Annex

HPA is in southeast San Francisco on a peninsula extending east into San Francisco Bay (Plate 1). The Navy property is 965 acres, approximately 500 acres on land and the rest in San Francisco Bay, which surrounds HPA on three sides. The fourth side is bounded by the Hunters Point district of San Francisco, which consists of public and private housing and commercial and industrial buildings. The north and east shores of HPA are developed for ship repair with drydocks and berths; there are no shipping facilities on the southwest shore.

1.2 History of Hunters Point Annex

Hunters Point was operated as a commercial drydock facility from 1869 until December 29, 1939, when the property was purchased by the Navy. The Navy leased the facility to the Bethlehem Steel Company until December 18, 1941. On that date, the Navy took possession and began operating the shipyard to provide accelerated production of liberty ships during World War II. Naval ships and submarines were also modified, maintained, and repaired. HPA was also used for personnel training, limited radiological operations, research and development, ship design, and nonindustrial services for Navy personnel and their families.

Available aerial photographs indicate that extensive cut-and-fill operations took place sometime between 1935 and 1948; filling throughout HPA appeared to be complete by 1975. Between 1935 and 1975, fill materials were placed in San Francisco Bay, increasing the land mass of the HPA facility from less than 100 acres to approximately 500 acres. Although documentation of the cut-and-fill operations is not known to exist, aerial photographs from the 1940s indicate that the majority of cut-and-fill probably occurred soon after the Navy took possession of the property in late 1941.

In 1974, the Navy ceased shipyard operations, placed the facility in industrial reserve, and transferred control to its Office of the Supervisor of Shipbuilding, Conversion and Repair, San Francisco (SUPSHIP-San Francisco).

In May 1976, Triple A Machine Shop signed a 5-year lease with the Navy for most of HPA and began operating a commercial ship repair facility. Triple A subleased portions of HPA to private warehousing, industrial, and commercial firms. In 1981, Triple A's lease was extended to June 1986. Triple A refused the Navy's request to vacate when the lease expired. The Navy began legal proceedings to retake possession, and, following actions taken by the San Francisco District Attorney's Office (DA), Triple A vacated the facility in mid 1987. The DA charged Triple A with illegally disposing of hazardous wastes at about 20 locations throughout HPA (*DA, 1986*). These locations, referred to as Triple A sites, are included in the Navy's Installation Restoration (IR) program. In 1992, Triple A was convicted on five counts of illegal hazardous waste disposal.

Between 1986 and 1988, the Navy considered homeporting the battleship USS Missouri at HPA. An extensive IR plan was developed and implemented during this period to expeditiously characterize the soil and groundwater contamination in parts of HPA as a prerequisite to development.

On the basis of the results of the investigations performed between 1986 and 1988, HPA was placed on the National Priorities List (NPL) in 1989 (*EPA, 1990*). As a result, the Navy is required to perform an RI/FS in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA). RI/FS activities are completed, underway, or planned for 20 IR sites at HPA as part of the IR program. These sites are divided into five OUs as defined in the Federal Facilities Agreement (FFA) signed between October 29, 1991, and January 22, 1992, by the Navy, the EPA, and the State of California's Department of Toxic Substances Control (DTSC) and Regional Water Quality Control Board, San Francisco Bay Region (RWQCB). OU II, the subject of this report, consists of the Tank Farm (Site IR-6), the Polychlorinated Biphenyl (PCB) Spill Area (Site IR-8), the Pickling and Plate Yard (Site IR-9), and the Battery and Electroplating Shop (Site IR-10).

In 1990, the U.S. Department of Defense placed HPA on the Base Closure List, which mandated that HPA be remediated and made available for nondefense use. HPA was designated as a "B" site by the Agency for Toxic Substances and Disease Registry (ATSDR) in 1991, meaning it poses no imminent threat but may have the potential to pose a long-term threat to human health.

In April 1992, the Navy proposed a new approach for the RI/FS program in which the HPA facility would be divided into five parcels to expedite remedial action and land reuse. The approach was described in the *Technical Memorandum, Operable Unit V Redefinition* (*HLA, 1992e*). Discussions with the agencies on the implementation of this approach are in progress.

1.3 Remedial Investigation/Feasibility Study Program

The RI/FS program at HPA consists of three primary components:

- Facility-wide investigations
- RI/FSs of parcels
- Interim action studies of interim-action-based OUs.

1.3.1 Facility-Wide Investigations

The following past, current, and future investigations at HPA are pertinent to the RI activities at OU II.

- Previous Investigations
  - Initial Assessment Study (*WESTEC, 1984*)
  - Area Study for Asbestos-Containing Material and Inorganic Soil Contamination (*EMCON, 1987b*)
  - Confirmation Study — Verification Step (*EMCON, 1987a*)
  - Preliminary Assessment (PA) — Sites PA-12 through PA-18 (*HLA, 1989a*)
  - PA Other Areas/Utilities (*HLA, 1990i, 1992c*)
  - Storm Drainage Water Quality Investigation (*HLA, 1991a*)

- Environmental Sampling and Analysis Plan (*ATT, 1991*)
- Radiation Investigations (*HLA, 1990d; PRC, 1992*).

- <u>Current or Planned Investigations</u>

  - Site Inspection Activities (*HLA, 1990b, 1992c*)
  - Assessment of Background Soil and Groundwater Conditions (*HLA, 1992d*)
  - Air Sampling (*HLA, 1988, 1990e, 1992j*)
  - Tidal Influence Monitoring (*PRC, 1991; HLA, 1992g*)
  - Aquifer Testing Program (*HLA, 1991b, 1992a*)
  - Ecological Risk Assessment (*HLA, 1992f*).

Work plans and the results of completed studies are presented in separate reports. The results of these completed studies are used, as appropriate, to support the interim-action studies and subsequent parcel RI/FSs. Results of ongoing studies that were not available for use in this interim-action study will be incorporated into parcel RI/FSs.

1.3.2 <u>Parcel-Based RI/FS Program</u>

As discussed in Section 1.2, the Navy has proposed dividing HPA into parcels to expedite remedial action and land reuse. Each parcel will require an RI/FS (except Parcel A, because of the limited potential for contamination in an upland nonindustrial area of HPA). The RI report for each parcel will contain a baseline risk assessment section that will be the Public Health and Environmental Evaluation (PHEE) report currently required by the FFA.

1.3.3 <u>Interim Action Studies</u>

Interim actions are being considered for 17 IR sites to initiate removal actions and facilitate early action in accordance with the SACM (*EPA, 1992a*). That document outlined a new paradigm for the Superfund program and called for the implementation of early actions to reduce immediate risks to human health or the environment while other studies (e.g., facility-wide studies of underground utility lines) continue. The Navy is employing aspects of the SACM to identify the need or opportunity for interim actions at HPA. As a result, the original OUs, including OU II, are now considered interim-action OUs. This ASR summarizes the results of an evaluation of interim action needs and opportunities at OU II.

1.4 Community Relations

Community relations activities relative to the environmental investigations at HPA are performed in accordance with the *Community Relations Plan* (*HLA, 1989b*). The community relations program is intended to (1) address community concerns regarding current or planned studies and cleanup activities at HPA, (2) provide accurate and timely information to citizens, public interest groups, and elected and agency officials, and (3) facilitate communication between the Navy and the community at large. The Navy is responsible for conducting the community relations activities in cooperation and close coordination with the EPA, DTSC, RWQCB, City and County of San Francisco, and other regulatory agencies. The community relations program generally consists of the following:

- Information releases, fact sheets, and newsletters
- Information repositories to facilitate public review of reports and decision documents
- Community informational meetings
- Public review and comment periods for documents presenting decisions on proposed actions
- Technical Review Committee meetings to discuss actions and proposed actions with respect to RI/FS activities.

1.5 Report Organization

Section 2.0 of this report describes the role and scope of interim action studies at HPA. Section 3.0 summarizes the geology and hydrogeology of the sites as well as the nature and extent of point-source-related contamination as presented in the OU II RI Report (*HLA, 1992h*). Section 4.0 presents applicable or relevant and appropriate requirements (ARARs) related to potential interim actions at OU II. Section 5.0 summarizes the risk assessment results as presented in the OU II PHEE Report (*HLA, 1992k*). Section 6.0 summarizes the screening and selection of remedial alternatives presented in the OU II FS Report and presents the preferred interim action alternative for the identified remedial units (*HLA, 1992l*). Section 7.0 summarizes the report, and Section 8.0 lists the references cited in the report. Appendix E is a point-by-point Navy response to agency comments on the Draft OU II ASR (*HLA, 1993a*).

2.0 ROLE AND SCOPE OF THE INTERIM ACTION STUDIES

2.1 Role and Scope of Interim Action Studies

RI/FS activities at HPA will result in final remedial actions protective of human health and the environment. Results of completed, ongoing, and proposed site-specific and facility-wide investigations, as identified in Section 1.3.1, will be used in selecting and implementing final remedial actions. Because of the expected length of time to complete ongoing or proposed activities, the possibility of implementing interim actions is being considered for the 17 IR sites in OUs I, II, III, and IV, and Group 5. An interim action may be considered appropriate when (*EPA, 1991*):

- Contamination poses an imminent threat to human health or the environment
- There is an opportunity to significantly reduce risk quickly.

The opportunity to act could apply to either existing or potential risk in cases where there is a good indication that final remedial action will be necessary.

2.2 Scope of OU II Interim Action Studies

This Summary ASR addresses potential interim actions at sites in OU II. The OU II interim action alternative evaluation process is limited by the status of data gathering and data interpretation being performed as part of RI/FS activities at HPA. Several of the more significant of these limitations are discussed below.

- **Sources of Contamination** — Chemicals detected in soil and groundwater result from both point and nonpoint sources. Point sources are related to waste management or disposal activities at a particular site. Chemicals from nonpoint sources either occur naturally in the soil or are present at the site due to human activities not related to a particular site (anthropogenic input). The Navy has proposed interim ambient levels (IALs) to aid in characterizing the extent of chemicals related to point sources. Discussions with the agencies are ongoing regarding the proposed IALs and their application to HPA.

Because nonpoint-source chemicals are present throughout HPA, it is impractical to develop remedial measures for them at individual IR sites. They will be considered in parcel-based RI/FS studies.

- **Status of Ecological Risk Assessment Activities** — Ecological receptors and potential risks to such receptors from chemicals at HPA have not been evaluated. As a result, this ASR does not address threats to the environment.

- **Presence of Uninvestigated Sites** — The IR sites in OU II are bordered by other potentially contaminated sites which are under investigation. Underground utilities such as storm drains and sanitary sewers are also potential sources of contamination. Underground utilities are being investigated on a facility-wide basis. Consequently, the effect of contamination from these uninvestigated potential sources cannot be considered in this OU II Summary ASR.

- **Future Land Use** — Future uses of land at OU II sites are not certain at this time. Discussions between the Navy and the City of San Francisco are ongoing regarding future land uses.

These conditions constrain the scope of the alternative evaluation process at OU II as compared to the potential scope of interim action studies described in Section 2.1. Specifically, an interim action for OU II is considered appropriate when:

- Contamination related to a point source poses an imminent threat to human health, or

- Final remedial action is likely, and an interim action will expedite final remedial action.

Either of these motivations is limited by:

- The availability of data sufficient to select and design a remedial alternative that would significantly reduce the risk to human health (i.e., there is an opportunity to take early action).

Interim actions at HPA are intended as early actions and would be consistent with any planned future actions and future land uses to the extent possible. Sites considered for interim action will be reconsidered for possible final actions as part of parcel RI/FS activities.

2.3 Interim Action Study Process

The need for interim action at each OU II site is evaluated and the preferred action is selected in three stages: (1) the characterization of contamination related to point sources, (2) the assessment of the risks to humans from these contaminants, and (3) the identification of the interim action remedial units and the selection of the preferred remedial alternative(s). Data collected during the RI and facility-wide investigations are evaluated to identify those contaminants related to point-source releases at the site. This ASR describes the nature and extent of point sources of chemicals. Chemicals related to nonpoint sources are not considered for interim action, but will be considered in parcel-based RI/FS studies.

Interim action alternative selection for OU II sites involves four steps. First, ARARs or other health-based levels are used to develop target remedial goals (TRGs), focusing on the chemicals in the media of concern that are estimated to present potential health risks, as discussed in the OU II PHEE. The TRGs are then used to define any interim action remedial units by identifying the distribution of chemicals in soil and groundwater above the TRGs. Second, remedial technologies are screened and appropriate interim action alternatives (including no action/institutional action) are chosen that have been proven effective in similar circumstances. Third, if an interim action remedial unit is defined, the alternatives are evaluated for overall protection of human health and compliance with ARARs and against the five National Oil and Hazardous Substances Pollution Contingency Plan (NCP) balancing criteria of: (1) long-term effectiveness, (2) reduction of toxicity, mobility, and volume, (3) short-term effectiveness, (4) implementability, and (5) cost (*EPA, 1988b*). Three interim action alternatives are then selected, evaluated, and compared against the criteria of long-term effectiveness, implementability, and cost; reduction of toxicity, mobility, and volume is used as a secondary criterion. Finally, the interim action alternative that best meets the three primary balancing criteria is selected as the preferred alternative.

Any final remedial actions at IR sites would be implemented as needed after the completion of the RI/FS for each parcel and the approval of a final Record of Decision (ROD).

3.0 SUMMARY OF THE OU II REMEDIAL INVESTIGATION

This section summarizes the results of the RI of the OU II sites as presented in the OU II RI Report (*HLA, 1992h*). Results pertinent to interim actions and discussed here include the geology, hydrogeology, history, physical conditions, suspected point sources, and extent of related contamination at each of the four OU II sites.

3.1 Geology and Hydrogeology

The geology of the sites generally consists of Artificial Fill (Qaf) and Undifferentiated Upper Sand Deposits (Quus) overlying Bay Mud Deposits (Qbm), Undifferentiated Sedimentary Deposits (Qu), and Franciscan Bedrock. The Artificial Fill (see Section 1.2) generally extends from the ground surface to as deep as 40 feet below ground surface (bgs), where bay mud, undifferentiated upper sands, or bedrock is encountered. Undifferentiated upper sands are generally absent where the bedrock surface is above mean sea level. The bedrock consists primarily of serpentinite, argillite, and siltstone and contains elevated levels of various heavy metals. The bedrock is the apparent source of most of the Artificial Fill at HPA.

Two aquifers have been identified at OU II sites. The uppermost or A-aquifer generally consists of saturated Artificial Fill and Undifferentiated Upper Sand Deposits with localized areas of Undifferentiated Sedimentary Deposits. The A-aquifer is present at all four sites; the groundwater levels are 4 to 8 feet bgs. Groundwater flow in the A-aquifer at all OU II sites is generally toward San Francisco Bay (Plates 2, 3, and 4). At Sites IR-6 and IR-10, the upper part of the Franciscan Bedrock, which consists of weathered serpentinite, has been designated the Bedrock Aquifer; it appears to be in hydraulic communication with the overlying A-aquifer.

3.2 Site Conditions

This section summarizes the history, physical conditions, suspected point sources, and extent of related contamination.

3.2.1 Site IR-8

3.2.1.1 History

The PCB Spill Area is southeast of former Building 503 and north of former Building 508 (Plate 2). The Navy discovered the spill area in 1986 while repairing an underground utility line. ERM-West investigated and did an interim soil removal in the area indicated on Plate 2 (*ERM-West, 1986, 1987, 1989*). The most likely PCB sources identified were a former transformer pad onsite and transformers on two power poles, one north and one southeast of the site (Plate 2).

The land at Site IR-8 was constructed during the extensive landfill operations in the 1940s. Building 503 was the base laundry and two grease traps associated with the building are shown on Plate 2. The building was demolished along with Buildings 508, 512, and 517 between 1977 and 1979. Building 606 and the surrounding paved area, covering almost half the site, were constructed in 1989 and are currently occupied by the U.S. Postal Service.

3.2.1.2 Physical Conditions

Site IR-8 is relatively flat with less than 2 feet of relief. Most of the site, including the excavated area, is paved or under Building 606. A paved parking lot covers the west end, and Hussey Street covers the east end. Drainage is via the storm drain system, which may back up during extreme high tides or periods of heavy storm runoff.

Offsite, a sewer pump station, no longer operational, is east of Hussey Street. Gravel and paved parking lots are north and south of the pump station. An open field is south of the site west of Hussey Street. Underground utility lines including steam lines, sanitary sewer lines, and storm drains run beneath and near the site.

3.2.1.3 Point Sources of Contamination and Related Chemical Distribution

Two suspected point sources of contamination have been identified at Site IR-8: the PCB spill, which appears to be associated primarily with the former transformer pad, and 1,1,1-trichloroethane (TCA) from former Building 503 (the base laundry). The contaminants that appear to be associated with these point sources are listed below and their lateral distribution is shown on Plate 2.

Suspected Point Source	Associated Contaminant and Maximum Concentration	
	In Soil	In Groundwater
PCB spill	Aroclor 1260 (7.2 mg/kg)	Aroclor 1260 (4.4 μg/l)
Base laundry	1,1,1-TCA (0.0073 mg/kg)	Not Detected

3.2.2 Site IR-9

3.2.2.1 History

From 1947 to 1973 the Pickling and Plate Yard was used for industrial metal finishing and painting. Chemicals used at the site included zinc chromate (paint primer), sodium dichromate, and sulfuric and phosphoric acids. Steel plates were dipped in acid tanks (pickled), dried on racks, and then painted with zinc-chromate-based corrosion-resistant primer. Paint residues coat about half the structures in the open rack area, especially near the pickling tanks. While in operation, some 15,000 gallons of acid-contaminated rinse water was reportedly discharged to the combined storm and sanitary sewer system each month (*WESTEC, 1984*).

Several tenants now occupy the buildings bordering the site, but the yard has not been used since 1973. The Navy's current plans for Site IR-9 include removing the pickling tank contents, the zinc chromate residue on all structures, and rainwater in the containment vault, and then dismantling and disposing of the empty pickling tanks and racks (*HLA, 1990h*).

3.2.2.2 <u>Physical Conditions</u>

The site is about 120,000 square feet (2.75 acres) at the north end of Hussey Street between Buildings 411 and 402 (Plate 3). Structures include one empty aboveground acid storage tank, three fluid-filled below-grade brick-lined pickling tanks housed in an open concrete emergency containment vault, six plate drying racks, two plate storage racks, and a large overhead crane system. Three acid storage tanks were previously reported, but only one was located during site inspections (*HLA, 1990h*). Most of the ground surface is covered by concrete or asphalt.

Underground utilities include a shallow storm drain system for drainage within the yard and a combined storm drain and sanitary sewer system near Building 411. A utility trench containing steam lines is in the northern part of the yard.

3.2.2.3 <u>Point Sources of Contamination and Related Chemical Distribution</u>

Two suspected point sources of contamination have been identified at Site IR-9: the pickling tanks and associated containment vault and the shallow surface storm drains. The contaminants that appear to be associated with these point sources are listed below and their lateral distribution is shown on Plate 3.

	Associated Contaminant and Maximum Concentration	
Suspected Point Source	In Soil	In Groundwater
Pickling tanks and containment vault	Hexavalent chromium (1.4 mg/kg)	Hexavalent chromium (460 $\mu g/l$) Total chromium (395 $\mu g/l$)
Shallow surface drainage lines	Hexavalent chromium (0.35 mg/kg)	Hexavalent chromium (130 $\mu g/l$) Total chromium (92.8 $\mu g/l$)

3.2.3 Sites IR-6 and IR-10

3.2.3.1 History

Tank Farm (Site IR-6)

Aerial photographs indicate that the Tank Farm was constructed in 1942 at what had been the shore in 1935. Two piers, observed in a 1935 photo, may have been incorporated into the fill emplaced north and west of the site between 1935 and 1948. The Tank Farm was used by the Navy until 1974 to store diesel fuel and lube oil, which were distributed through underground lines to the berths north and northeast of the site (*WESTEC, 1984*). Triple A Machine Shop reportedly used the Tank Farm from 1976 until they vacated the facility in 1986; Stoddard solvent may have been stored in two of the 286-barrel (bbl) tanks shown on Plate 4 (*HLA, 1990f*). Diesel oil reportedly spilled from a ruptured 286-bbl tank in the early 1940s; apparently, the contents of the tank overflowed the berm. The spilled diesel oil was removed to the Oil Reclamation Ponds, Site IR-3 (*WESTEC, 1984*). Recently the tanks were removed under a removal action; a report summarizing the removal activities is presently under preparation.

Battery and Electroplating Shop (Site IR-10)

Building 123 was constructed on emplaced fill and used for electroplating and battery storage and maintenance from 1946 through 1974. Waste acids containing cyanide, chromates, and heavy metals, mostly copper and lead, were reportedly spilled on the floor and in the loading dock area and discharged into floor drains connected to the storm drain system, which discharges to the Bay (*WESTEC, 1984*). Cyanide wastes were routinely disposed in containers at the industrial landfill, Site IR-1; chromates and heavy metals were poured into the floor drains. It has been estimated that 250,000 gallons of spent electrolyte contaminated with heavy metals were poured into the floor drains (*WESTEC, 1984*). An Acid Mixing Plant (Building 124) and several tanks were once located southeast of Building 123 (Plate 4); judging by aerial photographs, they were removed between 1979 and 1981.

3.2.3.2 Physical Conditions

Tank Farm (Site IR-6)

The Tank Farm was between Lockwood and Robinson Streets. The ground is paved with concrete or asphalt and is relatively flat except in the bermed areas. As shown on Plate 4, prior to their removal, the diesel fuel facilities included:

- A 5,000-bbl tank in one bermed area (labeled Diesel Tank)
- Eight 286-bbl vertical tanks in a second bermed area (labeled Tanks 1 through 8)
- A pump house (Building 112), which contains a sump and associated equipment
- Piping.

The former lube oil facilities included:

- A 286-bbl vertical tank (crosshatched) in a third bermed area

- A second pump house (Building 111), an empty sump, and associated piping
- Concrete tank support racks for eight horizontal lube oil tanks, which were removed.

The above facilities including the tanks, pump houses, support racks, and associated piping within the bermed areas have been or are now being removed as part of the Tank Farm Removal Action. Observations made during the removal action and conditions at the site at completion of removal will be addressed in an addendum to this ASR.

Battery and Electroplating Shop (Site IR-10)

Building 123 is north of the Tank Farm across Lockwood Street. Asphalt surrounds the building and covers the location of the former Acid Mixing Plant.

3.2.3.3 Point Sources of Contamination and Related Chemical Distribution

Three suspected point sources of contamination have been identified at Sites IR-6 and IR-10: the diesel and lube oil tanks, an unknown solvent source at the Tank Farm, and Building 123, including the floor and storm drains. The contaminants that appear to be associated with these point sources are listed below. The lateral extent of soil and groundwater contamination associated with any sources whose concentrations were detectable is shown on Plate 4. This plate does not reflect the removal or disturbance of any material at the Tank Farm as a result of present removal activities.

Suspected Point Source	Associated Contaminant and Maximum Concentration In Soil	In Groundwater
Diesel and lube oil tanks (Site IR-6)	BTEX (8.1 mg/kg) PAHs (75 mg/kg) TPH as diesel (26,000 mg/kg) TOG (110,000 mg/kg) PCBs (150 mg/kg)	BTEX (144 μg/l) PAHs (2,584 μg/l) TPH as diesel (4,900 μg/l) TOG (6,800 μg/l) Arsenic (12.5 μg/l)
Tank Farm activities and Industrial Operations at Building 123 (Sites IR-6 and IR-10)	Lead (2,580 mg/kg) Zinc (597 mg/kg)	Hexavalent chromium (120 μg/l)
Suspected solvent releases (Site IR-6)	1,2-DCE (0.047 mg/kg) TCE (0.19 mg/kg) PCE (2.2 mg/kg)	1,2-DCE (140 μg/l) TCE (5 μg/l) PCE (3 μg/l) Vinyl chloride (38 μg/l)
Building 123 (Site IR-10)	1,2-DCE (0.016 mg/kg) TCE (2.2 mg/kg) PCE (0.004 mg/kg)	1,2-DCE (66 μg/l) TCE (38 μg/l) Vinyl chloride (3 μg/l)

Abbreviations

BTEX = Benzene, toluene, ethylbenzene, and xylenes.

PAHs = Polycyclic aromatic hydrocarbons.

TPH = Total petroleum hydrocarbons.

TOG = Total oil and grease.

1,2-DCE = 1,2-Dichloroethene.

TCE = Trichloroethene.

PCE = Tetrachloroethene (Perchloroethene).

4.0 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

Under SARA Section 121(d) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 U.S.C. §9621[d]), selected response actions must attain a level or standard of control of hazardous substances that complies with promulgated or nonpromulgated applicable or relevant and appropriate requirements (ARARs) of federal environmental laws and more stringent state environmental and facility siting laws to assure the protection of human health and the environment.

This section provides a discussion of chemical-, action-, and location-specific ARARs relative to potential interim actions at OU II. This discussion is not intended to serve as the final determination of all ARARs for the OU. The identification of ARARs is an iterative process throughout the RI/FS, and the final determination of ARARs will be made by EPA as part of the selection of the remedy, and will take into account public comment. The possible "universe" of ARARs was previously presented in Section 5.0 and Appendix B of the OU II PHEE report (*HLA, 1992k*).

This analysis of ARARs is based in part upon the remedial alternatives studied during the ASR for Site IR-6 (see Section 6.0). ARARs were evaluated for all OU II sites in the OU II FS Report (*HLA, 1992l*); ARARs are presented here for Site IR-6 interim action alternatives considered in this ASR. Three interim action alternatives are considered for Site IR-6:

- **Interim Action Alternative 1** — No Action/Institutional Action
- **Interim Action Alternative 2** — Ex situ Biodegradation with Replacement of Treated Soil Onsite and Groundwater Extraction and Discharge to the Publicly Owned Treatment Works (POTW)
- **Interim Action Alternative 3** — Onsite Thermal Desorption with Replacement of Treated Soil Onsite and Groundwater Extraction and Discharge to the POTW.

4.1 Definition of ARARs

ARARs include "applicable" and "relevant and appropriate" requirements. In addition to these promulgated standards, EPA may also use guidance and health advisories as matters "to be considered."

- **Applicable Requirements** — Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. "Applicability" implies that the remedial action or the circumstances at the site satisfy all of the jurisdictional prerequisites of a requirement.

- **Relevant and Appropriate Requirements** — Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site.

- **To-Be-Considered Requirements (TBCs)** — TBCs are non-promulgated advisories or guidance issued by federal or state government that are not legally binding and do not have the status of potential ARARs. In many circumstances, however, TBCs will be considered along with ARARs as part of the site risk assessment and may be used in determining the necessary level of cleanup for protection of health or the environment.

4.2 ARAR Categories

ARAR categories include:

- **Chemical-Specific ARARs** — These ARARs are usually health- or risk-based numerical values or methodologies which, when applied to site-specific conditions, result in the establishment of numeric values. These values establish the acceptable amount or concentration of a chemical that may be found in, or discharged to the ambient environment.

- **Location-Specific ARARs** — Location-specific ARARs are restrictions placed on the concentration of hazardous substances or the conduct of activities solely because they occur in special locations.

Location-specific ARARs relate to the geographical or physical position of the site (e.g., presence of wetlands, endangered species, flood plains, etc.).

- **Action-Specific ARARs** — Action-specific ARARs are usually technology- or activity-based requirements or limitations on actions taken with respect to hazardous substances.

4.3 Site IR-6 ARARs

For Interim Action Alternative 1, No Action/Institutional Action, the following potential ARARs have been identified:

- Title 40, Code of Federal Regulations (40 CFR), Part 141, Subpart B, Maximum Contaminant Levels (MCLs); chemical-specific and location-specific ARARs. Primary and secondary MCLs and MCL goals (MCLGs) for drinking water are identified in 40 CFR Part 141. Corresponding state requirements are found in Title 22, California Code of Regulations (22 CCR), Division 4, Chapter 15. Because potentially potable water has been identified at the unit, MCLs and MCLGs for total cPAHs, hexavalent chromium, benzene, 1,2-dichloroethene, trichloroethene, and vinyl chloride may be relevant and appropriate for this alternative.

- California Health and Safety Code (CH&SC), Division 20, Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65); action-specific and chemical-specific ARAR. Proposition 65 prohibits the discharge of known human carcinogens or reproductive toxins to sources of drinking water or on land where it could pass into a source of drinking water. Chemicals and regulatory levels are listed in 22 CCR, Section 12000, et seq., as well as requirements for warnings of consumer product, occupational, and environmental exposures. Because benzene, hexavalent chromium, lead, trichloroethene, and vinyl chloride, which are listed under Proposition 65, are chemicals of concern at this unit (see Section 5.0), the requirements for occupational and environmental exposure warnings may be relevant and appropriate.

- State Water Resources Control Board (WRCB) Resolution No. 68-16, Policy on Maintaining the High Quality of State Waters; action-specific and chemical-specific ARAR. The antidegradation policy has been incorporated into all Regional Board Basin Plans and requires that the quality of waters of the State that is better than needed to protect all beneficial uses be maintained. At the least, beneficial uses must be protected. This ARAR is applicable to this alternative.

- State WRCB Resolution No. 88-63, Sources of Drinking Water Policy; location-specific ARAR. The drinking water policy sets various criteria for designation of drinking water sources, including ground or surface water with total dissolved solids concentrations less than 3,000 mg/l; sources with less than 3,000 mg/l TDS have been identified at this unit. This ARAR may be relevant and appropriate to this alternative.

- 40 CFR Section 264.14, Security; action-specific ARAR. Owners and operators of hazardous waste treatment, storage, or disposal (TSD) facilities must prevent the unknowing entry, and minimize the possibility for the unauthorized entry, of persons or livestock, onto the active portion of the facility; in addition, warning signs must be posted. Material at Site IR-6 has been identified at concentrations considered hazardous; therefore, this requirement may be relevant and appropriate because the unit could be considering a hazardous waste storage facility. Corresponding state requirements for security, under the state's requirements for TSDs, are found at 22 CCR Section 66264.14.

- 40 CFR, Part 264, Subpart F, Releases from Solid Waste Management Units; action-specific ARAR. Owners and operators of TSD facilities must comply with the groundwater monitoring program requirements identified in this subpart for purposes of detecting, characterizing, and responding to releases to the uppermost aquifer. Because chemicals at concentrations considered hazardous have been identified at Site IR-6, the development and implementation of a program to meet the substantive requirements may be considered relevant and appropriate. Corresponding state requirements for groundwater monitoring, under the state's requirements for TSDs, are found at 22 CCR, Chapter 14, Article 6, Water Quality Monitoring and Response Programs for Permitted Facilities.

- 40 CFR Section 264.119, Post-Closure Notices; action-specific ARAR. Under this requirement, a restriction is placed on the deed to a property which restricts uses of the property. Because chemicals at concentrations considered hazardous have been identified at Site IR-6, a deed restriction may be relevant and appropriate. Corresponding state requirements are found in 22 CCR Section 66264.119.

- EPA Guidelines for Groundwater Classification Under the EPA Groundwater Protection Strategy; TBC. This EPA guidance defines parameters for Class I, II, and III potable drinking water sources. One of the parameters used to identify potable drinking water sources and to differentiate between classes is a TDS concentration less than 10,000 mg/l. During review of alternative selection remedies, groundwater with less than 10,000 mg/l TDS was considered potentially potable. Because the guidelines defined in this EPA document are not promulgated standards, they have been identified as TBCs.

For Interim Action Alternative 2, Ex Situ Biodegradation with Replacement of Treated Soil Onsite and Groundwater Extraction and Discharge to the POTW, the following potential ARARs have been identified:

- 40 CFR, Part 141, Subpart B, MCLs; chemical-specific and location-specific ARARs. Primary and secondary MCLs are identified in 40 CFR Part 141. MCLs and MCLGs can be considered remedial action objectives for ambient ground and surface water where the water is a source of drinking water. Corresponding state requirements are found in 22 CCR, Division 4, Chapter 15. MCLs/MCLGs have been considered for total cPAHs, hexavalent chromium, benzene, 1,2-dichloroethene, trichlorethene, and vinyl chloride. These requirements may be relevant and appropriate to groundwater that meets state or federal definitions of potentially potable water.

- CH&SC, Division 20, Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65); action-specific and chemical-specific ARAR. Proposition 65 prohibits the discharge of known human carcinogens or reproductive toxins to sources of drinking water or on land where it could pass into a source of drinking water. Chemicals and regulatory levels are listed in 22 CCR, Section 12000, et seq. as well as requirements for warnings of consumer product, occupational, and environmental exposures. Because benzene, hexavalent chromium, lead, trichloroethene, and vinyl chloride, which are listed under Proposition 65, are chemicals of concern at this unit (see Section 5.0), the requirements for occupational and environmental exposures warnings may be relevant and appropriate.

- State WRCB Resolution No. 68-16, Policy on Maintaining the High Quality of State Waters; action-specific and chemical-specific ARARs. The antidegradation policy has been incorporated into all Regional Board Basin Plans and requires the maintenance of the quality of waters of the state that is better than needed to protect all beneficial uses. At the least, beneficial uses must be protected. This ARAR is applicable to this alternative.

- State WRCB Resolution No. 88-63, Sources of Drinking Water Policy; location-specific ARAR. The drinking water policy sets various criteria for designation of drinking water sources, including ground or surface water with a total dissolved solids concentrations less than 3,000 mg/l; sources with less than 3,000 mg/l TDS have been identified at this unit. This ARAR may be relevant and appropriate to this alternative.

- 40 CFR, Section 264.601, Environmental Performance Standards; action-specific ARAR. Owners and operators of TSDs at which hazardous waste is stored in miscellaneous units must locate, design, construct, operate, maintain, and close those units in a manner that will ensure protection of human health and the environment. Because hazardous waste may be stored under this alternative, the substantive requirements of Section 264.601 may be considered relevant and appropriate (e.g., prevention of releases that may have adverse effects on human health or the environment due to migration of waste constituents into surface water, wetlands, soil, or air).

- 40 CFR Part 268, Land Disposal Restrictions, Section 268.7, Waste Analysis and Recordkeeping; action-specific ARAR. Generators of hazardous waste must test their waste to determine if the waste is restricted under this part. These requirements are applicable to this alternative only if any treated soil is shown to be a hazardous waste and is to be disposed offsite.

- Section 402(p) of the Clean Water Act; chemical-specific ARAR. The Clean Water Act imposes restrictions on the discharge of pollutants to waters of the United States. At the state level, these requirements are enforced through Waste Discharge Requirements (Porter-Cologne Water Quality Act). Groundwater must meet pretreatment standards set by the POTW, which must comply with its National Pollutant Discharge Elimination System (NPDES) permit and effluent limitations.

- 23 CCR, Division 3, Chapter 15; action-specific ARAR. Chapter 15 includes requirements for siting, design, construction, operation, closure, and monitoring (including corrective action) for waste discharges to land for treatment, storage, or disposal, including landfills, surface impoundments, waste piles, and land treatment facilities. Because the ex situ bio treatment unit may be considered a waste management unit, these requirements may be considered as relevant and appropriate.

- 23 CCR, Division 3, Chapter 15, Article 5; action-specific ARAR. Article 5 contains monitoring requirements for waste management units. Because the material resulting from the bioremediation process would be temporarily stored onsite, while analysis is being conducted to confirm that the material is not a hazardous waste, these requirements may be considered as relevant and appropriate.

- EPA Guidelines for Groundwater Classification Under the EPA Groundwater Protection Strategy; TBC. This EPA guidance defines parameters for Class I, II, and III potable drinking water sources. One of the parameters used to identify potable drinking water sources and to differentiate between classes is a TDS concentration less than 10,000 mg/l. During review of alternative selection remedies, groundwater with less than 10,000 mg/l TDS was considered potentially potable. Because the guidelines defined in this EPA document are not promulgated standards, they have been identified as TBCs.

For Interim Action Alternative 3, Onsite Thermal Desorption with Replacement of Treated Soil Onsite and Groundwater Extraction and Discharge to the POTW, the following potential ARARs have been identified:

- 40 CFR, Part 141, Subpart B, MCLs; chemical-specific and location-specific ARARs. Primary and secondary MCLs and MCLGs are identified in 40 CFR Part 141. MCLs can be considered remedial action objectives for ambient ground and surface water where the water is a source of drinking water. Corresponding state requirements are found in 22 CCR, Division 4, Chapter 15. MCLs/MCLGs have been considered for total cPAHs, hexavalent chromium, benzene, 1,2-dichloroethene, trichlorethene, and vinyl chloride. These requirements may be relevant and appropriate to groundwater that meets state or federal definitions of potential potability.

- CH&SC, Division 20, Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65); action-specific and chemical-specific ARAR. Proposition 65 prohibits the discharge of known human carcinogens or reproductive toxins to sources of drinking water or on land where it could pass into a source of drinking water. Chemicals and regulatory levels are listed in 22 CCR, Section 12000, et seq., as well as requirements for warnings of consumer product, occupational, and environmental exposures. Because benzene, hexavalent chromium, lead, trichloroethene, and vinyl chloride, which are listed under Proposition 65, are chemicals of concern at this unit (see Section 5.0), the requirements for occupational and environmental exposure warnings may be relevant and appropriate.

- State WRCB Resolution No. 68-16, Policy on Maintaining the High Quality of State Waters; action-specific and chemical-specific ARAR. The antidegradation policy has been incorporated into all Regional Board Basin Plans and requires the maintenance of the quality of waters of the State that is better than needed to protect all beneficial uses. At the least, beneficial uses must be protected. This ARAR is applicable to this alternative.

- State WRCB Resolution No. 88-63, Sources of Drinking Water Policy; location-specific ARAR. The drinking water policy sets various criteria for designation of drinking water sources, including ground or surface with TDS less than 3,000 mg/l; sources with less than 3,000 mg/l TDS have been identified at this unit. This ARAR may be relevant and appropriate to this alternative.

- 40 CFR, Section 264.601, Environmental Performance Standards; action-specific ARAR. Owners and operators of TSDs at which hazardous waste is stored in miscellaneous units must locate, design, construct, operate, maintain, and close those units in a manner that will ensure protection of human health and the environment. Because hazardous waste may be stored under this alternative, the substantive requirements of Section 264.601 may be considered relevant and appropriate (e.g., prevention of releases that may have adverse effects on human health or the environment due to migration of waste constituents into surface water, wetlands, soil, or air).

- Section 402(p) of the Clean Water Act; chemical-specific and action-specific ARARs. The Clean Water Act imposes restrictions on the discharge of pollutants to waters of the United States. At the state level, these requirements are enforced through Waste Discharge Requirements (Porter-Cologne Water Quality Act). Groundwater must meet the pretreatment standards set by the POTW, which in turn must comply with its NPDES permit and effluent limitations.

- 23 CCR, Division 3, Chapter 15; action-specific ARAR. Chapter 15 includes requirements for siting, design, construction, operation, closure, and monitoring (including corrective action) for waste discharges to land for treatment, storage, or disposal, including landfills, surface impoundments, waste piles, and land treatment facilities. Because the material resulting from the thermal desorption process would be temporarily stored onsite while analysis is being conducted to confirm that the material is not a hazardous waste, these requirements may be considered as relevant and appropriate.

- 23 CCR, Division 3, Chapter 15, Article 5; action-specific ARAR. Article 5 contains monitoring requirements for waste management units. Because the material resulting from the thermal desorption process would be temporarily stored onsite while analysis is being conducted to confirm that the material is not a hazardous waste, these requirements may be considered as relevant and appropriate.

- Bay Area Air Quality Management District (BAAQMD) Rules and Regulations; action-specific and chemical-specific ARARs. The BAAQMD requires a permit for this type of operation. Therefore, the specific design and operating conditions specified in the permit supplied by the vendor are applicable and, therefore, may be considered action-specific and chemical-specific ARARs.

- EPA Guidelines for Groundwater Classification Under the EPA Groundwater Protection Strategy; TBC. This EPA guidance defines parameters for Class I, II, and III potable drinking water sources. One of the parameters used to identify potable drinking water sources and to differentiate between classes is a TDS concentration less than 10,000 mg/l. During review of alternative selection remedies, groundwater with less than 10,000 mg/l TDS was considered potentially potable. Because the guidelines defined in this EPA document are not promulgated standards, they have been identified as TBCs.

5.0 SUMMARY OF THE OU II PUBLIC HEALTH AND ENVIRONMENTAL EVALUATION

A baseline public health and environmental evaluation (PHEE) was performed as a component of the OU II RI/FS. OU II RI data were used to estimate the potential human health risks associated with the chemicals detected at the OU II sites. The environmental impacts of the chemicals on ecological receptors are being investigated on a facility-wide basis and thus were not addressed in the OU II PHEE (*HLA, 1992k*), as noted in Section 2.0. The PHEE results were used in the OU II FS to develop TRGs and interim remedial alternatives for the OU II sites, as necessary. The parcel RI/FS studies will consider the effectiveness of interim actions with respect to protection of ecological receptors identified in the facility-wide ecological risk assessment. The methods and results of the human health risk assessment at OU II sites are summarized below.

5.1 Methods and Assumptions

The OU II PHEE was performed in accordance with EPA guidance on human health risk assessments, especially *Risk Assessment Guidance for Superfund*, known as RAGS (*EPA, 1989c*). Human exposures via air, soil, and groundwater pathways to the chemicals detected at each of the OU II sites were assessed on the basis of a number of assumptions. These human health risk assessment results are limited by the following:

- OU II sites are near other sites under or planned for investigation. The risks estimated for OU II sites do not include any additive risks posed by chemicals at nearby sites.
- Underground utility lines that cross OU II sites were not addressed in the RI or PHEE. Underground utilities such as sanitary sewers, storm drains, and fuel distribution lines are being investigated on a facility-wide basis.
- Chemicals in San Francisco Bay water or sediments and the potential migration pathways of such chemicals to the Bay were not addressed in the PHEE; they are being investigated on a facility-wide basis.

- Future land uses at OU II sites are unknown. The exposure scenarios quantified in the PHEE were conservatively developed by assuming that people will live or work at the sites in the future.

5.2 Receptors and Exposure Pathways

The HPA facility is currently used for light industrial and commercial purposes. There are no permanent residents, workers, or other users (e.g., recreational) at OU II sites. Over 90 percent of the area of the sites is paved or covered by buildings or other structures. Strict security controls, including fences, gates, and guards, prevent access to these sites. For these reasons, no current exposures to permanent residents were evaluated.

Hypothetical future exposures were evaluated because land uses at HPA may change in the future. After considering all possible human receptor populations, three were selected for evaluation:

- Construction workers who might build future residences or other structures on the sites
- Office workers who might work at the sites for up to 25 years
- Residents including children who might live at the sites for up to 30 years.

The hypothetical future onsite exposure pathways quantified for each receptor population were as follows:

Exposure Pathway	Construction Workers	Office Workers	Residents
Inhalation of outdoor dust	x	x	x
Inhalation of indoor dust		x	x
Ingestion of soil	x	x	x
Ingestion of fruits grown onsite			x
Ingestion of vegetables grown onsite			x
Dermal contact with soil	x	x	x
Ingestion of groundwater as drinking water		x	x
Dermal contact with groundwater during showering		x	x
Inhalation of vapors from groundwater during showering		x	x

Average and reasonable maximum exposure (RME) scenarios were developed for each pathway and receptor. A receptor typical of the population was assumed to be exposed to the site-specific average chemical concentrations in the average scenario and to a concentration equal to or near the highest measured concentration in the RME scenario. The average scenario thus provides a generally realistic estimate of potential health risks, and the RME scenario provides a conservatively high estimate.

5.3 Chemicals of Concern

The chemicals of concern (COCs) in soil and groundwater were identified on a site-by-site basis in a process consistent with EPA guidance. The frequency of detection and toxicity of the chemicals were considered, and the site concentrations were compared with potential ARARs or other health-based concentrations. The COCs selected for the OU II sites are listed in Table 1. These COCs were used to quantify the inhalation, ingestion, and dermal exposure pathways listed above. Exposures to the COCs in soil were evaluated separately for each of the four sites; however, because of the proximity of Sites IR-6 and IR-10, exposures to the COCs in groundwater at these two sites were evaluated as though the sites were one site (Site IR-6/IR-10). Because groundwater at Site IR-8 is not considered potable on the basis of state and federal drinking water criteria, there are no groundwater COCs listed for this site, and risks associated with occurrences of chemicals in groundwater at this site were not evaluated in the OU II PHEE or ASR; groundwater monitoring at this site will be performed as part of the Facility Groundwater Monitoring Program (*HLA, 1992i*). Occurrences of chemicals in groundwater at this site will be evaluated against environmental health criteria or ARARs specific to the groundwater below Site IR-8 in parcel RI/FS studies.

5.4 Exposures with Adverse Health Effects

For each site, separate average and RME estimates of carcinogenic and noncarcinogenic effects were predicted from the hypothetical chemical exposures. The risk estimates for individual exposure pathways for each receptor population were then summed to derive total average and RME exposure estimates. Because a given receptor may not be exposed to all RME pathways simultaneously, the total RME exposure estimates would overpredict the health risks. The following sections list the exposure scenarios that are estimated to result in adverse health effects. For these scenarios, estimated risks exceeding the EPA target risk of cancer (a 1-in-10,000 probability that an exposed individual will develop cancer from potential exposure to carcinogens, i.e., 1×10^{-4}) or threshold levels for noncarcinogenic health effects (Hazard Index [HI] exceeding 1.0) are presented.

5.4.1 Soil at Site IR-8

Noncarcinogenic Effects

- Inhalation of dust by construction workers, primarily due to manganese, in the RME scenario.

- Exposures of resident children via multiple pathways in both the average and RME scenarios (adverse health effects were not predicted for any pathway alone).

Carcinogenic Effects

- Dermal contact with soil by residents, primarily due to Aroclor 1260 and cPAHs, for the RME scenario.

5.4.2 Soil and Groundwater at Site IR-9

Noncarcinogenic Effects

- Inhalation of dust by construction workers, primarily due to manganese, in the RME scenario.

- Ingestion of soil and homegrown produce by children due to simultaneous exposure to a number of chemicals including lead in the RME scenario.

- Ingestion of groundwater primarily due to antimony, arsenic, chromium VI, and manganese, in the RME scenario, for office worker and resident adults and in both the average and RME scenarios for resident children.

Carcinogenic Effects

- Use of groundwater for domestic purposes including drinking and showering by office workers and residents, primarily due to arsenic and chromium VI (ingestion) and cPAHs (dermal contact during showering), in both the average and RME scenarios.

5.4.3 Soil at Site IR-6

Noncarcinogenic Effects

- Inhalation of dust by construction workers, primarily due to manganese, in the RME scenario.

- Ingestion of soil and homegrown produce by resident children due to simultaneous exposure to a number of chemicals, including lead, in the RME scenario. (Construction workers may also be affected by ingestion of soil containing lead.)

- Simultaneous exposure of residents via multiple pathways to a number of chemicals in both the average and RME scenarios for children and the RME scenario for adults.

Carcinogenic Effects

- Ingestion of soil by residents due to Aroclor 1260, in the average and RME scenarios for children and the RME scenario for adults.

- Dermal contact with soil primarily due to Aroclor 1260, in both the average and RME scenarios for resident children and the RME scenario for office worker and resident adults.

5.4.4 Soil at Site IR-10

Noncarcinogenic Effects

- Inhalation of dust by construction workers, primarily due to manganese, in the RME scenario.

- Exposure of resident children via multiple pathways, particularly the ingestion of soil and homegrown produce, primarily due to lead and manganese, in the RME scenario.

- Simultaneous exposure of residents via multiple pathways to a number of chemicals for adults in both the average and RME scenarios, and for children in the RME scenario (adverse health effects were not predicted for any pathway alone).

Carcinogenic Effects

- Simultaneous exposure of resident children via multiple pathways to a number of chemicals in the RME scenario (adverse health effects were not predicted for any pathway alone in the RME scenario).

5.4.5 Groundwater at Sites IR-6 and IR-10

Noncarcinogenic Effects

- Ingestion of groundwater primarily due to antimony, arsenic, chromium VI, and manganese, in the average and RME scenarios for resident children and the RME scenario for office worker and resident adults.

- Dermal contact with groundwater during showering by residents due to simultaneous exposures to a number of chemicals in the RME scenario.

Carcinogenic Effects

- Ingestion of groundwater by office workers and residents, primarily due to arsenic, chromium VI, and vinyl chloride, in the RME scenario.

5.4.6 Results

The PHEE results are summarized in Tables 2 and 3 by site and exposure pathway in terms of the estimated risks to hypothetical future resident children and commercial office workers, respectively. Ingestion and dermal contact with soil and groundwater are generally the most important exposure pathways for residents and office workers; potential adverse health effects are predicted to be greater for residents, especially children. As presented above, inhalation of dust is the most important exposure pathway for future hypothetical construction workers.

The chemicals of most concern for potential noncarcinogenic adverse health effects at OU II sites for the pathways and receptors evaluated in this report are antimony, arsenic, chromium VI, lead, and manganese. The chemicals of most concern with potential cancer risks are Aroclor 1260 in soil, vinyl chloride and other VOCs, arsenic, and chromium VI in groundwater, and cPAHs in both media. The potential adverse health effects of antimony, arsenic, manganese, lead, and possibly other metals may be associated in part with ambient conditions at HPA, which in turn may be associated in part with natural occurrences of these metals in geologic materials of the Artificial Fill.

In relative terms, the potential adverse health effects of exposures to chemicals in soil are greatest at Site IR-6. The magnitude of such effects is lower at Sites IR-8, IR-9, and IR-10, and similar among these sites, although the sources differ. In relative terms, the potential adverse health effects of exposures to chemicals in groundwater are greater at Site IR-9 than at Site IR-6/IR-10. The groundwater at Site IR-8 is not potable.

In conclusion, conservative assumptions and scenarios for future hypothetical exposures were used in the OU II PHEE; therefore, the actual health risks may be less than those predicted, and in some cases may be negligible.

5.4.7 Target Remedial Goals

TRGs were developed in the OU II FS Report primarily for the point-source-related COCs identified at each site that presented health risks (*HLA, 1992l*). The rationale for focusing on point sources is discussed in Section 2.2. A target chemical is a chemical that is considered for remediation in the FS and this ASR, and for which a TRG was developed. TRGs were also developed for petroleum hydrocarbons and oil and grease. TRG calculations for residential scenarios were presented in the OU II FS (*HLA, 1992l*); TRG calculations for commercial scenarios are included in this ASR as Appendix A. The TRGs for each target chemical in soil for the commercial use scenario were developed using the methods presented in Appendix A of the OU II FS Report for the residential scenario (*HLA, 1992l*). Remedial units were then identified for the volumes of soil or groundwater that contained concentrations of target chemicals or petroleum hydrocarbons above TRGs. TRGs presented in the following table were developed within the following framework:

- The TRGs for target chemicals in soil developed for the OU II FS Report were based on an assumed residential scenario at the OU II sites (*HLA, 1992l*). Commercial uses are also possible for these sites; therefore, TRGs in soil are presented for both residential and commercial use scenarios in this ASR. Appendix A presents the commercial use TRG calculation methods. These TRGs were estimated on the basis of:
    - Exposure of the most sensitive residential receptor (child) and office worker to the target chemical in surface soil (i.e., top 2 feet) via inhalation, ingestion, and dermal contact exposure pathways.

- Comparison of residual health effects to threshold levels for noncarcinogenic chemicals and the upperbound EPA target risk for carcinogenic chemicals.

- Risk reduction for construction workers was not evaluated because appropriate health and safety measures are expected to be implemented during construction or remedial activities at the sites.

- TRGs for petroleum fuels (diesel) and oil and grease in soil are proposed for residential and commercial land uses. TRGS for petroleum hydrocarbons as diesel of 500 and 1,000 mg/kg for residential and commercial scenarios, respectively, are comparable to concentrations approved by the regulatory agencies at similar sites.

- The TRGs for groundwater were based on the available federal MCLs, MCLGs, or total health-based levels (tHBLs) as defined in the OU II PHEE Report based on ingestion and inhalation exposure pathways (*HLA, 1992k*). Groundwater containing TDS above the EPA criterion of 10,000 milligrams per liter (mg/l) for drinking water was eliminated from further consideration for remediation; chemicals detected in groundwater will be reconsidered in the parcel RI/FS studies.

The TRGs for each target chemical in soil and groundwater for the residential and commercial use scenarios are listed separately below.

Target Chemical(s)	Residential Use TRGs for Soil Remedial Unit (mg/kg)			
	Site IR-8	Site IR-9	Site IR-6	Site IR-10
Aroclor 1260	0.5	--	0.5	--
cPAHs	0.5	--	0.5	--
Lead	--	200	200	200
TPH as diesel	--	--	500	500
Oil and grease	--	--	500	500

Target Chemical(s)	Commercial Use TRGs for Soil Remedial Unit (mg/kg)			
	Site IR-8	Site IR-9	Site IR-6	Site IR-10
Aroclor 1260	--	--	2.0	--
cPAHs	--	--	2.5	--
Lead	--	1,000	1,000	1,000
TPH as diesel	--	--	1,000	1,000
Oil and grease	--	--	1,000	1,000

Residential and Commercial Use TRGs for Groundwater Remedial Unit (µg/l)

Target Chemical(s)	Site IR-9	Sites IR-6/IR-10	Source
Total cPAHs	0.2	--	Federal MCLG/MCL
Hexavalent chromium	100	100	Federal MCLG/MCL
Benzene	--	5	Federal MCLG/MCL
1,2-Dichloroethene	--	70	Federal MCLG/MCL
2-Methylnaphthalene	--	542*	tHBL
Naphthalene	--	542*	tHBL
Phenanthrene	--	542*	tHBL
Trichloroethene	--	5	Federal MCL
Vinyl chloride	--	2	Federal MCL

-- = Not applicable; chemical not targeted for remediation in this medium at this site for this scenario.

* = tHBL conservatively based on residential scenarios; revised from 54.2 based on 1992 publications (*EPA, 1992b,c*); (*HLA, 1992k*).

a = Based on OU II PHEE (*HLA, 1992k*), commercial use scenarios do not result in health risks exceeding EPA target criteria.

TRGs for TPH diesel and TOG in soil at Site IR-6 are lower than TRGs proposed in the OU IV ASR (*HLA, 1993b*), because of differences in site conditions. Hydrocarbons in soil at Site IR-6 occur below the water table and appear to have affected water quality near the former location of the Tank Farm. Hydrocarbons in soil at OU IV do not appear to be in contact with groundwater and do not appear to have resulted in degradation of water quality. Consequently, proposed TRGs at OU IV are based on human health considerations relative to direct contact with the soil and do not address potential for degradation of water quality.

6.0 ANALYSIS AND SELECTION OF INTERIM ACTION ALTERNATIVES

This section presents the results of the OU II FS that have been used to identify interim action remedial units and alternatives at the OU II sites (*HLA, 1992l*).

6.1 Interim Action Remedial Units

In the OU II FS Report, remedial units were defined at each site for soil and at Sites IR-9, IR-6, and IR-10 for groundwater (*HLA, 1992l*). The lateral boundaries of the remedial units were defined by the occurrence of target chemicals at concentrations above their respective TRGs; at IR-6, diesel fuel concentrations were also used to define remedial units. The vertical boundaries of soil remedial units at three sites (IR-8, IR-9, and IR-10) were defined as extending to 3 feet bgs, to include 2 feet of surface soil and up to a 1-foot safety margin. The soil remedial unit at the Tank Farm (Site IR-6) was defined as extending to 16 feet bgs because soil to this depth contains petroleum products at concentrations above their TRGs. The groundwater remedial units at the three sites were defined as encompassing the entire thickness of the uppermost aquifer.

Because of the limitations inherent in the RI/FS process and the goal of accelerating cleanup of sites before the final parcel-wide RI/FS process is complete, interim actions are being considered at the OU II sites. The following criteria were used to select interim action remedial units:

- The contamination is associated with point sources from site-related activities.
- The levels of contamination present do not comply with ARARs such as MCLs.
- Current site conditions may pose an imminent or long-term threat to existing or potential future human receptors.

- Data sufficient to design and implement remedial action are available and such an action would not exacerbate the problem or hinder future implementation of long-term action.

- Engineering and field considerations that may affect implementability, long-term effectiveness, cost, and reduction of toxicity, mobility, and volume were considered.

The soil and groundwater remedial units described in the OU II FS Report were considered for interim action against the criteria above, and were retained or eliminated from consideration as interim action remedial units for the following reasons (*HLA, 1992k*):

- <u>Site IR-8 Soil</u>

  The Aroclor 1260 and 1,1,1-TCA present in soil at this site appear to be the only chemicals related to point-source contamination that also COCs in the OU II PHEE. However, the concentrations present do not pose an immediate threat to human receptors because current users are not expected to be exposed. Potential exposures to future users of the site, assuming continued commercial uses of the site and surrounding area, could be mitigated; therefore, direct contact exposures to soil through the exposure pathways described in the OU II PHEE Report are not expected. This remedial unit, therefore, was eliminated from further consideration for interim action (*HLA, 1992k*). Groundwater at the site will be monitored as part of the Facility Groundwater Monitoring Program (*HLA, 1992i*).

- <u>Site IR-9 Soil and Groundwater</u>

  The chromium VI present in soil at this site appears to be the only chemical whose occurrence may be related to site-specific point sources; however, chromium VI was not selected as a COC because of the low concentrations present. Although total chromium as chromium VI was detected above MCLs in the groundwater at this site, its detection in monitoring wells was spatially discontinuous. In addition, the groundwater at this site is not currently used as a water supply, and it is doubtful whether it would ever be considered as a water supply source in the future. Therefore, these remedial units were eliminated from further consideration for interim action.

  Human health and environmental risks at this site will be reevaluated in the parcel RI/FS studies. A removal action is planned for this site to remove immediate human health hazards such as paint residue and chemical-bearing pickling tanks (*HLA, 1990h*). Groundwater at the site will be monitored as part of the Facility Groundwater Monitoring Program.

- <u>Site IR-10 Soil and Groundwater</u>

  The lead present in soil in one area beneath the pavement at this site appears to be the only point-source-related chemical that was also a COC in the OU II PHEE Report. However, because the site is presently not used, and is partially covered by a building and pavement, the threat of exposure to lead is limited; therefore, the soil remedial unit was not considered further for interim action (*HLA, 1992k*).

  Although organic constituents were detected above MCLs in the groundwater at this site, the concentrations of organics appear to be decreasing over time and are at or only slightly above MCLs. Groundwater at the site will be monitored as part of the Facility Groundwater Monitoring Program to further evaluate these trends. In addition, it is doubtful whether the groundwater at this site would ever be considered as a water supply source in the future. Therefore, these remedial units were not considered further for interim action.

- <u>Site IR-6 Soil and Groundwater</u>

  Soil at Site IR-6 contains point-source contamination from diesel fuel, oil and grease, and from COCs such as cPAHs, PCBs, and lead, as discussed in the OU II RI Report (*HLA, 1992h*). The areas that contain COCs in surface soil are within the areas of diesel fuel and oil and grease associated with the Tank Farm. Estimated risks to hypothetical future commercial workers suggest that final remedial action would be likely at this site. Therefore, the Site IR-6 soil remedial unit identified in the OU II FS Report is considered for interim action, which could be implemented after the removal of the tanks and associated structures (*HLA, 1992l, 1990f*).

  The diesel fuel and oil and grease appear to have impacted the groundwater at the site; therefore, the groundwater containing concentrations of organic constituents above MCLs and which may be associated with the diesel fuel and oil and grease in the soil is also considered for interim action. Although chromium as chromium VI was detected above MCLs in the groundwater at this site, its detection in monitoring wells is considered to be related to the naturally occurring serpentinite bedrock at Site IR-6. The groundwater at this site is not currently used as a water supply, and it is doubtful whether it would ever be considered as a water supply source in the future. Therefore, this part of the groundwater remedial unit was eliminated from further consideration for interim action.

In summary, portions of the soil and groundwater remedial units at Site IR-6 that were described in the OU II FS Report are considered for interim action and are described below; remedial units at the other OU II sites were eliminated from consideration for interim action (*HLA, 1992l*).

6.1.1 Interim Action Soil Remedial Unit

The interim action soil remedial unit at Site IR-6 is the area of soil contamination related to point-source releases with concentrations above TRGs for commercial use, because commercial use is the current scenario at the site. The unit consists of approximately 7,000 cubic yards (cy) of soil containing primarily petroleum hydrocarbons as diesel fuel and oil and grease. Also contained within the boundaries of the petroleum-contaminated area are shallow areas (up to 3 feet) containing cPAHs in two locations, PCBs in two locations, and lead in five locations (Plate 5). These additional areas (hotspots) containing target chemicals above TRGs consist of an estimated 100 cy of soil each. The portion of the interim action soil remedial unit that contains petroleum hydrocarbons extends in most areas to the water table, which is approximately 8 to 10 feet bgs; however, in several borings, elevated levels above TRGs were detected below the water table. Because there are significant amounts of bedrock in the subsurface beneath the Tank Farm, field evaluations will be performed regarding the practical extent of excavation. If excavation is implemented for treatment and/or disposal of soil, the remedial unit in these areas may extend up to 6 feet below the water table, or to the extent practicable using available, proven engineering techniques. Field screening equipment, visual inspections, and soil chemical analyses will be used to determine the depth of the excavation. Shoring and dewatering may be necessary; contingencies for removal of the bedrock will be addressed during the design phase.

6.1.2 Interim Action Groundwater Remedial Unit

The interim action groundwater remedial unit consists of two discontinuous areas, as shown on Plate 5. The larger groundwater plume area is defined by Wells IR06MW22A, -23A, -30A, -32A, -35A, and -48F north of the Tank Farm and contains organic constituents such as TCE, vinyl chloride, and 1,2-DCE. The smaller groundwater plume area, defined on the basis of results from samples collected from Well IR06MW42A on Lockwood Street next to Building 134, contains organic constituents such as naphthalene. The groundwater remedial units and estimated groundwater cleanup times were described in the OU II FS Report (*HLA, 1992k*). Because EPA guidance for health-based levels for noncarcenogenic PAHs, including naphthalene (a target chemical at IR-6), has changed since the OU II FS Report was published, a revised groundwater cleanup time estimate for the area beneath Lockwood Street is presented in Appendix B (*EPA, 1992b,c*). (See Section 5.4.7 for cleanup levels.)

6.2 Interim Action Objectives

The overall remedial action objectives (RAOs) at the OU II sites are to reduce the aggregate human health risks associated with carcinogenic site-related chemicals to within a range of 10^{-4} to 10^{-6} for excess cancer risks and to reduce the potential adverse health effects of noncarcinogenic site-related chemicals to below the threshold values as indicated by HI values of less than 1.0. These RAOs are in accordance with CERCLA guidance and were presented in the OU II FS Report (*EPA, 1989c; HLA, 1992k*). Because this ASR focuses on interim action, the exposure-specific interim RAOs and potential remediation requirements presented in the OU II FS have been revised and are listed below. Long term remedial action objectives are also presented in the table. Long term objectives such as preventing further leaching of chemicals into the groundwater are considered during the interim action evaluation process. Short-term objectives, particularly with respect to construction workers, are not explicitly considered in this ASR but would be addressed during the planning and design phase for any recommended interim actions.

Exposure	Interim RAO	Potential Remediation Requirements
Ingestion or Dermal Contact with Soil		
Short-term	Minimize direct exposure of onsite construction workers during interim action in any area with unacceptable risk.	Personal protection and monitoring.
Long-term	Reduce potential chronic chemical exposures of potential future onsite users in any area with unacceptable risk.	Source containment, deed restrictions, fencing-off site, removal, and/or treatment in any area with unacceptable risk.
Leaching of Chemicals from Soil to Groundwater/Ingestion of Groundwater		
Long-term	Prevent further leaching of chemicals from soil to groundwater that might cause groundwater chemical concentrations to exceed TRGs.	Source containment, deed restrictions, monitoring programs, removal, and/or treatment.
Volatilization/Ingestion of Groundwater		
Short- and long-term	Minimize further degradation of groundwater and perform interim action in any area with contamination greater than the TRGs.	Deed restrictions or hydraulic control of contaminated groundwater and source soil removal if source is known.
Inhalation of Dust in Air		
Short-term	Minimize direct exposure of onsite construction workers during interim action and maintain background air quality levels or regulatory standards.	Minimization of temporary releases during remediation, personal protection and monitoring.
Long-term	Prevent significant deterioration of soil, maintain background air quality levels and reduce future onsite user chemical exposures in any areas with unacceptable risk.	Monitoring of air quality, deed restrictions, fencing offsite, source containment, removal, or control.

6.3 Initial Screening and Evaluation of Interim Action Alternatives for Site IR-6

The initial screenings of general response actions, remedial technologies, and associated process options were summarized in the OU II FS Report (*HLA, 1992k*). The screening of remedial technologies was based on the technical feasibility of implementing each technology; for example, aerobic biodegradation is not technically feasible for the remediation of inorganic constituents in soil. The technologies that were determined to be technically feasible were then evaluated on the basis of effectiveness, implementability, and relative cost.

6.3.1 Soil

The following actions and options passed the initial screening and subsequent evaluation for remediation of the onsite soil:

- No Action/Institutional Action
- Containment
  - Capping
  - Surface water controls
- Collection
  - Soil excavation
- Treatment
  - Incineration
  - Asphalt batching
  - Thermal desorption
  - Soil washing
  - Ex situ aerobic biodegradation
  - Stabilization/fixation
  - Catalytic incineration (offgas)
  - Carbon adsorption (offgas)
- Disposal
  - Replacement onsite after treatment
  - Offsite disposal
  - Remain in place (no action)

6.3.2 Groundwater

Groundwater treatment was fully evaluated in the OU II FS Report and was found to be infeasible; because the groundwater is brackish, it would require extensive softening and filtration to reduce its hardness of the water before treatment by other processes to remove organic constituents associated with point sources.

The high hardness of the groundwater presents a significant operational problem for both types of organic treatment methods considered feasible, and would cause significant scaling of process equipment. In order to minimize scaling, pH adjustment and softening pretreatment would be required to remove some of the hardness. Softening would include lime/soda ash softening, postsoftening treatment by granular media filtration, and sludge handling including thickening and dewatering (see Figure E1 in Appendix E). One drawback of softening would be the increase in concentration of some of the constituents in the wastewater stream such as sulfates, TDS, and potentially chlorides.

The primary treatment options considered effective and feasible for organic constituents in the Site IR-6 groundwater remedial unit are (1) air stripping with vapor-phase granular activated carbon (GAC) and resin adsorption offgas treatment, and liquid-phase GAC polishing, and (2) advanced oxidation process (ultra violet [UV]/hydrogen peroxide) with liquid-phase GAC polishing. A conceptual treatment train utilizing these processes is shown in Attachment A to Appendix E. These treatment options address the range of organic constituents of concern including naphthalene, vinyl chloride, TCE, and 1,2-DCE. These constituents have a large range of volatilities and adsorption characteristics. Vinyl chloride, TCE, and 1,2-DCE are all volatile and can be easily removed from the groundwater by air stripping; naphthalene (a semivolatile organic compound [SOC]) is not very volatile and will not be removed to an appreciable extent by air stripping. Naphthalene and TCE will adsorb to GAC, but vinyl chloride and 1,2-DCE have poor adsorption characteristics, and will pass through a GAC adsorption unit largely unaffected. All of the organic constituents of concern are oxidizable to an appreciable extent in an advanced oxidation process.

In the first treatment option, air stripping would remove most of the volatile organic compounds (VOCs) and some of the semivolatile organic compounds (SOCs) from the groundwater. SOCs not removed in the air stripper would be removed by the liquid-phase GAC polishing unit. The total organic discharge to the atmosphere from the air stripper would be less than a pound per day, which potentially exempts the stripper from offgas treatment under BAAQMD permit requirements. A risk evaluation would have to be performed to show that the risk posed by the TCE, vinyl chloride, and benzene emitted was acceptable. If offgas treatment were determined to be necessary, stripped VOCs in the air stripper offgas would be run through vapor phase carbon to capture most constituents and to reduce the load to the resin adsorption unit. Vinyl chloride that passes through the vapor-phase GAC unit, as well as some other compounds with low adsorption affinity such as DCE, could be captured by the resin adsorption system.

Under the second treatment option, organic constituents would be oxidized by a combination of UV light and hydrogen peroxide. The organic chemicals would be oxidized to carbon dioxide, water, and other harmless constituents. Any constituents not fully oxidized would be removed by the liquid-phase GAC polishing unit before discharge.

The proposed treatment train could meet discharge requirements for the POTW and could potentially meet discharge requirements for surface water discharge; however, NPDES permit discharge limits for storm drain discharge or agricultural use discharge limits could not be met without further treatment of sulfates and chlorides. These latter limits could potentially be met by further treatment using either evaporation or reverse osmosis.

Residuals generated by the conceptual treatment train (Figure E1 in Appendix E) include lime/soda softening sludge (probably nonhazardous), filter backwash sludge (probably nonhazardous), spent GAC (potentially hazardous), and spent adsorptive resin (under air stripping option; potentially hazardous). In general, a large quantity of residuals requiring offsite transport and disposal would be generated for a very low wastewater flow.

The estimated capital cost for the conceptual treatment train is on the order of $350,000, and O&M costs are estimated to be around $100,000 per year.

The groundwater meets POTW discharge limits before treatment, so the main effect of treatment would be to needlessly remove low level organic constituents, some metals, and reduce the hardness. Given the estimated low flow rates and the option of discharging to the POTW without pretreatment, the high treatment costs for a groundwater treatment option are not justified.

In addition, it is unlikely that shallow aquifer water will ever be used as a potential drinking water source; therefore, treatment was eliminated from further consideration as an interim action. The parcel RI/FS will reassess the long-term aspects of groundwater remediation; for purposes of interim action at OU II sites, hydraulic control of the groundwater can be accomplished in the short-term by collection and discharge to the POTW.

Based on an initial screening of groundwater treatment options, the treatment described above is considered the most viable treatment option at present. However, a pilot study would need to be conducted to identify site-specific parameters that could affect the implementation of this alternative if groundwater treatment were chosen as a long-term remedial alternative at Site IR-6. The pilot study would examine this alternative at an appropriate level of detail, providing further information on the suitability of the various components of treatment.

Based on the above discussion the following actions and options passed the initial screenings and subsequent evaluation for interim action remediation of the onsite groundwater:

- No Action/Institutional Action
- Groundwater Collection
  - Extraction wells/trenches
  - Subsurface drains
- Disposal
  - Discharge to Publicly Owned Treatment Works (POTW).

6.3.3 Summary of Sitewide Remedial Alternatives Presented in the OU II FS Report

In the OU II FS Report, the various technologies listed above were combined to form eight remedial alternatives for the site as a whole. These alternatives were described in detail in the OU II FS Report (*HLA, 1992l*) and are described briefly in Appendix C. Except for Alternative 1, the no action/institutional action alternative, each of the seven action alternatives includes groundwater collection and discharge to the POTW, and treatment of chemical-bearing soil.

6.4 Selection of Interim Action Alternatives

Each of the eight remedial alternatives presented in the OU II FS Report was assessed using the nine CERCLA criteria (*EPA, 1988b*; *HLA, 1992l*). The following balancing criteria were used as the primary basis for the selection of two preferred interim action alternatives from the eight alternatives:

- Implementability
  - Are the technologies available and proven?
  - Are adequate data available to design an interim action?
  - Is a treatability study needed? How long would it take?
- Long-term effectiveness
  - Would the interim action be consistent with facility-wide or parcel-based remediation?
  - Would it meet final action objectives?
- Cost.
  - Would it be economically feasible?

The following secondary balancing criterion was also used:

- How much would the interim action reduce the toxicity, mobility, and volume of contaminants?

The fifth balancing criterion, short-term effectiveness, was not explicitly considered in this analysis; however, it was discussed in the OU II FS Report (*HLA, 1992l*). It is assumed for this analysis that proper planning during implementation of interim actions would be adequate to address concerns in this area.

6.5 Detailed Analysis of Interim Action Alternatives

The no action/institutional action alternative and the two treatment alternatives that best met all of the criteria were then compared using the CERCLA criteria

(Section 6.4) as Interim Action Alternatives 1, 2, and 3. A summary of ARARs discussed in the OU II FS Report is presented in Section 4.0 as they pertain to each interim action alternative (*HLA, 1992l*).

- **Interim Action Alternative 1** — No action/institutional action.
- **Interim Action Alternative 2** — Onsite ex situ aerobic biodegradation with replacement of treated soil onsite and groundwater extraction and discharge to the POTW.
- **Interim Action Alternative 3** — Onsite thermal desorption with replacement of treated soil onsite and groundwater extraction and discharge to the POTW.

6.5.1 Interim Action Alternative 1 — No Action/Institutional Action

Interim Action Alternative 1, the CERCLA-required baseline for comparison, would involve taking no further action to treat, contain, or remove any of the chemical-bearing soil or groundwater. The implementation of this alternative would presumably discontinue any further remedial measures at the site after implementation of the Tank Farm removal action. Ongoing groundwater monitoring might be required to assess the potential risk to human health and the environment, and deed restrictions would probably be imposed. This alternative is summarized in Table 6.

6.5.1.1 Implementability

There would be no technical barriers to the immediate implementation of Interim Action Alternative 1 because the soil and groundwater at the site would be left undisturbed. It is expected that continued monitoring of the groundwater would be necessary, and deed restrictions would need to be imposed if this land is transferred before completion of the final ROD. In addition, site access should be limited by maintenance of the existing fence and posting of warning signs.

6.5.1.2 Cost

The costs associated with implementation of this alternative are shown in Appendix D, Table D1. The net present value (NPV) for the estimated total capital and operations and maintenance (O&M) costs is approximately $440,000. The capital costs would be limited to those associated with establishing or promoting institutional controls such as deed restrictions, maintaining the fence surrounding areas containing chemicals that pose a risk, complying with regulations prohibiting development of drinking water wells in areas where nonpotable groundwater exists, and establishing a vehicle for ongoing reporting of monitoring data. The capital costs are estimated at $30,000. The O&M costs are those associated with quarterly and annual sampling of the existing monitoring well network for 5 years, which SACM guidance suggests as the maximum time period of performance for costing purposes (*EPA, 1992a*). The NPV of the estimated total O&M costs is $407,000. The actual O&M costs could be higher if additional downgradient monitoring wells are required to monitor potential downgradient migration of chemicals.

6.5.1.3 Long-Term Effectiveness

Although the no action/institutional action alternative might theoretically achieve the remedial goals over time through natural degradation, there would be no significant immediate risk reduction except that associated with institutional restrictions on access to the soil and groundwater and the current capacity for warning through monitoring. Institutional controls may not provide a reliable means of reducing risks to humans in the long-term because, although the site is presently not in use, it may be used in the future. At present, most chemical-bearing soil is covered by pavement or buildings, inhibiting direct human contact. Some areas are bare and would constitute potential exposure pathways; however, the Tank Farm removal action includes installation of a temporary cap which would prevent contact with COCs in soil and further leaching of chemicals to the groundwater via rainwater infiltration (*HLA, 1990f*) prior to any additional removal actions or final remedial actions.

6.5.2 Interim Action Alternative 2 — Onsite Ex Situ Aerobic Biodegradation with Replacement of Treated Soil Onsite and Groundwater Extraction and Discharge to the POTW

The soil would be sampled and analyzed to identify the small surface areas (900 cy) that contain lead, PCBs, or cPAHs, which would be disposed at a Class I or II landfill depending on concentrations detected during field sampling. The remaining soil containing petroleum hydrocarbons (6,100 cy) would then be treated by aerobic biodegradation in an onsite soil treatment unit (STU). Groundwater would be collected through trenches in one area and a well in another area and would be discharged to the POTW.

The onsite STU would be a rectangular, lined, bermed treatment pad about 250 by 350 feet, capable of containing 3,100 cy of soil 12 inches deep, and with a sand layer 6 inches deep. The finished surface could be sloped so that excess rainwater would be captured, pumped to a storage tank, held, and returned to the STU as irrigation water or discharged to the POTW if sampling indicated treatment of the water by recycling it into the STU was not necessary. The STU would include the treatment pad and an additional 8,500 square feet for stockpiling soil. The STU could process up to 3,100 cy of soil at a time. A preliminary estimate of the time required for treatment to TRGs for each of two batches is 4 months. Therefore, construction of the STU and treatment of 6,100 cy of soil would take approximately 1 year.

Preremediation studies would be required to estimate the time required to degrade the organic constituents to below the TRGs and would take approximately 4 to

6 weeks to complete. A preliminary study of Site IR-6 soil indicated that sufficient microbial populations exist to degrade the organic constituents.

Treatment would consist of irrigating and mechanically aerating the soil to increase microbial activity. An aqueous inorganic nutrient solution would be applied to the soil on a regular basis; the amount and rate would be based on pretreatment laboratory studies and process monitoring data. To maintain proper soil moisture, the STU would be irrigated as needed with municipal water or stormwater runoff collected onsite and would be applied using a water truck or sprinkler system. The controlled application of nutrients and moisture would not be expected to result in the generation of significant leachate. The nutrient-amended and irrigated soil would be mechanically aerated two or three times per week.

After treatment, the soil would be sampled approximately once per 50 cy and analyzed for petroleum hydrocarbons as diesel and for oil and grease by EPA Test Methods 8015M and 503D, respectively. A statistical sampling plan would be implemented based on EPA guidance; it is expected that one sample every 50 cy would be adequate to evaluate whether TRGs have been met (*EPA, 1989a*). When sampling and analysis indicated that the TRGs have been met for a soil batch, it would be removed and replaced in the excavated area.

Volatile air emissions would not be expected to be a significant problem for soil containing diesel fuel and oil and grease. These petroleum hydrocarbon molecules have carbon chains of 11 to 36 carbon atoms and boiling points greater than 150°C; therefore, no significant volatilization would be expected, and demonstration of compliance with the substantive requirements of the air permitting process of the BAAQMD would not be needed for onsite treatment.

Hotspots requiring disposal at a Class I or II landfill would have to be manifested, and the landfill facility would require soil testing before disposal. Analysis of the hotspots containing lead using a leaching test would be required to determine acceptability under applicable land disposal restrictions; i.e., the concentrations of lead in the soil may be at levels that require stabilization at the offsite landfill facility before disposal.

Groundwater collection would consist of installing an extraction trench approximately 300 feet long within the excavated area, and a separate well in the other area beneath Lockwood Street. Because the groundwater extraction rates are expected to be low, a storage unit would be installed to collect an adequate volume of water for discharge. On the basis of review of San Francisco POTW discharge acceptance requirements, the concentrations of point-source and nonpoint-source chemicals present in the groundwater are significantly lower than the current limits imposed by the POTW; therefore it is expected that the groundwater would be discharged in batches directly to the onsite sanitary sewer system under permit from the POTW.

The competency of the sanitary sewer system was verified by video scanning within the piping network (*YEI, 1988*); therefore, discharge to the POTW would be accomplished through piping the water to the nearest functional sanitary sewer. This alternative is summarized in Table 6.

6.5.2.1 Implementability

This alternative would involve practiced and implementable procedures requiring specialized equipment; aerobic biodegradation equipment is available from several vendors. Aerobic biodegradation is a proven technology and would require only minimal treatability data; some of the data have already been collected and analyzed and indicate favorable soil conditions for biodegradation. A 4- to 6-week study would indicate the rate of reduction in contamination and the levels achievable through this method. On the basis of HLA's past experience, this method has achieved nondetectable levels (10 mg/kg) of petroleum products (*HLA, 1991c*).

Construction of a groundwater collection trench, well, and associated piping are practiced and implementable procedures and are available from several vendors. A POTW batch discharge permit application would need to be submitted 45 days prior to the commencement of the discharge.

6.5.2.2 Cost

The costs associated with implementation of this alternative are shown in Appendix D in Table D2. The NPV of the estimated total costs is approximately $2,480,000. The capital cost of $1,920,000 would include excavating, transporting, and disposing hotspots, onsite aerobic biodegradation of soil, and groundwater collection and discharge to the POTW. O&M costs associated with groundwater collection and disposal are estimated at $108,000 per year. There may also be future administrative costs for obtaining new permits, renewing existing permits, or demonstrating compliance with the substantive requirements of permitting agencies. The NPV of the estimated total O&M costs to operate and monitor the groundwater collection and disposal system for 5 years, which SACM guidance suggests as the maximum time period for costing purposes, is $560,000 (*EPA, 1992a*).

6.5.2.3 Long-Term Effectiveness

Implementing this alternative would result in an immediate reduction in long-term risks to current and future users of HPA. This alternative would eliminate the potential for human exposure and further contamination of the groundwater and is expected to meet the final action objectives at the site. Residual risks after treatment would be within or below the EPA target risk range of 10^{-4} to 10^{-6}, based on results of the application of the methodology used to estimate TRGs as described in Appendix A of the OU II FS Report and in Section 5.4 of this report (*HLA, 1992l*). The soil covered by pavement or buildings poses little immediate risk to humans unless the current conditions change and the soil cover or soil are disturbed. The groundwater would be collected and disposed, eliminating the potential for human exposure. This alternative is estimated to require 11 years to meet the groundwater TRGs for the larger groundwater remedial unit area associated with the Tank Farm (*HLA, 1992l*). For the groundwater considered for interim action beneath Lockwood Street, up to 3 years to achieve TRGs may be required, based on cleanup time estimates using new values published in 1992 for noncarcinogenic PAHs (*EPA, 1992b, c*). The groundwater modelling calculations for the chemicals in the area beneath Lockwood Street were presented in the OU II FS Report are revised and presented in Appendix B (*HLA, 1992l*). Deed restrictions would be needed to inform potential users that groundwater treatment could be required to remove any existing contamination.

6.5.3 Interim Action Alternative 3 - Onsite Thermal Desorption with Replacement of Treated Soil Onsite and Groundwater Extraction and Discharge to the POTW

The soil would be sampled and analyzed to identify the small surface areas (900 cy) that contain lead, PCBs, or cPAHs, which would be disposed at a Class I or II landfill depending on concentrations detected during field sampling. The remaining soil containing petroleum hydrocarbons (6,100 cy) would then be treated by thermal desorption in an onsite unit. Groundwater collection and disposal would be as described in Section 6.5.2 for Interim Action Alternative 2.

The thermal desorption unit would be a mobile unit with heated screw conveyors that would mix the soil and raise its temperature to 400°F to volatilize organic constituents. Because the soil contains fractured bedrock, the rock might need to be crushed and screened prior to treatment. The maximum soil volume that could be processed by a single unit is 300 cy of soil a day; therefore, for the 6,100 cy of soil, treatment would take about 1 to 2 months. Volatile air emissions from the treatment unit would have to be monitored, and the substantive requirements of the air permitting process would have to be met in accordance with BAAQMD standards for onsite thermal treatment. Although HPA is a Superfund site and is therefore exempt from permit requirements, compliance with the substantive requirements of any necessary permits must be demonstrated. Vendor experience indicates that a permit could be obtained, or compliance could be demonstrated for onsite treatment within 3 to 6 months; therefore, remediation would take approximately 6 to 9 months.

After treatment, the soil would be sampled approximately once per 50 cy and analyzed for petroleum hydrocarbons as diesel and for oil and grease by EPA Test Methods 8015M and 503D, respectively. A statistical sampling plan would be implemented based on EPA guidance; it is expected that one sample every 50 cy would be adequate to evaluate whether TRGs have been met (*EPA, 1989a*). When sampling and analysis indicate that the TRGs have been met for a soil batch, it would be removed and replaced in the excavated area.

A pretreatment study by the vendor of the thermal desorption unit would take approximately 2 weeks to complete. The pretreatment study would determine the need for precrushing the rock, the effect of the moisture content of the soil, the levels achievable through this method, and the time required to reach these levels (*Ryan-Murphy, 1992*).

Hotspots requiring disposal at a Class I or II landfill would have to be manifested, and the landfill facility would require soil testing before disposal. Analysis of the hotspots containing lead using a leaching test would be required to determine acceptability under applicable land disposal restrictions; i.e., the concentrations of lead in the soil may be at levels that require stabilization at the offsite landfill facility before disposal.

This alternative is summarized in Table 6.

6.5.3.1 <u>Implementability</u>

This alternative would involve practiced and implementable procedures requiring specialized equipment. Onsite thermal desorption units have been permitted in the Bay Area by the BAAQMD and are readily available for lease; therefore, demonstration of compliance with the substantive requirements of the permitting process is expected to be achievable. Thermal desorption is a proven technology and would require only minimal treatability data. This data could be collected in a small bench scale test that would take approximately 2 weeks to perform. The test would indicate the rate of reduction in contamination (soil with moisture above 20 percent may need to be processed a second time) and the levels achievable through this method. Vendors have indicated that this method could achieve a cleanup level of 20 mg/kg (*Ryan-Murphy, 1992*). In addition, prescreening and crushing of the large rock fraction is a standard and implementable procedure.

Groundwater collection and disposal would be as described in Section 6.5.2 for Interim Action Alternative 2.

6.5.3.2 Cost

The costs associated with implementation of this alternative are shown in Appendix D in Table D3. The NPV of the estimated total costs is approximately $2,580,000. The capital cost of $2,020,000 would include excavating, transporting and disposing hotspots, onsite thermal desorption treatment, and groundwater collection and discharge to the POTW. O&M costs associated with groundwater collection and disposal are estimated at $108,000 per year. There may also be future administrative costs for obtaining new permits, renewing existing permits, or demonstrating compliance with the substantive requirements of permitting agencies. The NPV of the estimated total O&M costs to operate and monitor the groundwater collection and disposal system for 5 years, which SACM guidance suggests as the maximum time period for costing purposes, is $560,000 (*EPA, 1992a*).

6.5.3.3 Long-Term Effectiveness

Implementing this alternative would result in an immediate reduction in long-term risks to current and future users of HPA. This alternative would eliminate the potential for human exposure and for further contamination of the groundwater and is expected to meet the final action objectives at the site. Residual risks after treatment are expected to be within or below the EPA target risk range of 10^{-4} to 10^{-6}, based on results of the application of the methodology used to estimate TRGs as described in Appendix A of the OU II FS Report and in Section 5.4 of this report (*HLA, 1992l*). The soil covered by pavement or buildings poses little immediate risk to humans unless the current conditions change and the soil is disturbed. The groundwater would be collected and disposed, eliminating the potential for human exposure. This alternative is estimated to require 11 years to meet the groundwater TRGs for the larger area of the groundwater remedial unit and 3 years for the smaller area. Deed restrictions would need to inform potential users that groundwater treatment would be required to produce a source of potable water.

6.5.4 Comparison of Interim Action Alternatives

A summary of the comparison of interim action alternatives is shown in Table 6. Interim Action Alternative 1 would not provide overall protection of human health and the environment and would not be expected to meet the chemical-specific ARARs for soil. Interim Action Alternatives 2 and 3 would significantly increase overall protection of human health and the environment by removing and treating the chemical-bearing soil and collecting and disposing the groundwater. Interim Action Alternatives 2 and 3 are expected to achieve TRGs for soil and groundwater.

In terms of long-term effectiveness, Interim Action Alternative 1 would not be effective; it would allow direct contact with chemical-bearing soil in unpaved areas and would allow the potential migration of chemicals in the soil to the groundwater. It might gradually reduce the toxicity but probably not the mobility or volume of the chemicals in the soil. Interim Action Alternatives 2 and 3 would be effective in the long term because the soil and groundwater would be treated. Both alternatives would reduce the toxicity, mobility, and volume of the chemicals in the soil and groundwater.

All three Interim Action alternatives are implementable subject to the ability to demonstrate compliance with the substantive requirements of any permitting or approval processes. Interim Action Alternatives 2 and 3 would require a sewer discharge permit from the San Francisco POTW and Interim Action Alternative 3 would require that compliance with the substantive requirements of the permitting process from the BAAQMD be demonstrated. State, federal, and community acceptance of the Interim

Action remedial alternatives cannot be determined at this time and will be addressed in the ROD.

The estimated total costs for each alternative vary considerably and are listed below:

- Interim Action Alternative 1: $440,000
- Interim Action Alternative 2: $2,480,000
- Interim Action Alternative 3: $2,580,000

6.6 Selection of the Preferred Interim Action Alternative

Because the no action/institutional action alternative would not provide overall protection to human health or the environment and the purpose of interim action is to initiate remediation of areas that will eventually require cleanup, this alternative was not considered further. The two remaining alternatives, which are equally protective, were compared on the basis of their implementability and cost as follows:

- **Availability of Technology** — Both technologies are equally available, although onsite treatment by thermal desorption would require that the substantive requirements of the permitting process were met and biodegradation would not; demonstration of compliance with substantive requirements for the thermal desorption unit onsite could take 3 to 6 months.

- **Adequate Data and Length of Treatability Study** — There are adequate performance data on both. Biodegradation would require a 4- to 6-week treatability study and thermal desorption would require a 2-week treatability study to determine the time required to meet the TRGs.

- **Cost Effectiveness** — Biodegradation would cost an estimated $100,000 less than thermal desorption.

- **Reduction of Toxicity, Mobility, and Volume** — Both would reduce all three parameters and are expected to achieve TRGs.

- **Time Required for Remediation** — The time required for treatment are similar; treatment of soil by thermal desorption could be completed earlier than biodegradation; however, both types of treatment would achieve TRGs within a time frame appropriate for interim action.

In summary, both alternatives use proven, effective technologies. The biodegradation alternative may have a slight cost advantage over thermal desorption. In addition, demonstration of compliance with requirements of permitting agencies for biodegradation are expected to be less than for thermal desorption. For these reasons, aerobic biodegradation was selected as the preferred Interim Action Alternative.

7.0 SUMMARY AND CONCLUSIONS

The Navy has recently begun incorporation of SACM guidance in implementing remedial actions at HPA. As a result, OU II is now considered an interim-action OU, and the need for interim action before final parcel-based RI/FSs are completed was evaluated. Interim action remedial alternatives are considered for areas with point-source contamination that pose a current or likely future risk to human health or the environment; however, environmental receptors were not considered in this report. The remedial units and alternatives presented in the FS report were modified to develop the interim action remedial units and alternatives presented in the ASR. This ASR, a component of the RI/FS for the HPA facility, summarizes the draft RI, PHEE, and FS reports prepared for OU II, identifies interim remedial units, and recommends an interim action remedial alternative for the units (*HLA, 1992h,k,l*).

Because of the limitations inherent in the RI/FS process and the goal of accelerating cleanup of sites before the final parcel-wide RI/FS process is complete, interim actions are being considered at the OU II sites. The following criteria were used to select interim action remedial units:

- The contamination is associated with point sources from site-related activities.
- The levels of contamination present do not comply with ARARs such as MCLs.
- Current site conditions pose an immediate threat to existing human receptors or a potential long-term threat to potential future users.
- Data sufficient to design and implement remedial action are available and such an action would not exacerbate the problem or hinder future implementation of long-term action.
- Engineering and field considerations that may affect implementability, long-term effectiveness, cost, and reduction of toxicity, mobility, and volume were considered.

The soil and groundwater remedial units described in the OU II FS Report were considered for interim action against the criteria above. Interim action remedial units were only defined for areas containing point-source chemicals that pose a human health risk; the results are summarized below.

- Aroclor 1260 is the only chemical associated with suspected point-source releases in soil at Site IR-8 that was estimated to pose human health risks to a hypothetical resident; potential risks are associated primarily with dermal contact with soil (*HLA, 1992k*). Potentially significant risks were not predicted for existing and possible future receptors assuming continued commercial uses of the site and site vicinity.

- Hexavalent chromium is the only chemical in soil and groundwater that is associated with suspected point-source contamination at Site IR-9; the occurrences of chromium were not considered to pose an imminent threat to current users or a likely potential threat to future users, except for the potential case of groundwater being used as drinking water in the future.

- At Site IR-10, lead, zinc, and VOCs are associated with the suspected point sources. Soil containing elevated lead concentrations was detected in one area at Site IR-10 beneath pavement; but because the site is presently paved, the threat of exposure to lead is limited. Concentrations of zinc and VOCs were not considered to pose a human health risk.

- At Site IR-6, the lead, PCBs, and cPAHs in soil and VOCs and SOCs in groundwater are chemicals associated with suspected point sources that may pose human health risks to existing or possible future receptors under both residential or commercial uses of this site; potential risks are associated primarily with ingestion and dermal contact with soil. The presence of diesel fuel and oil and grease is also related to suspected point sources at Site IR-6. Therefore, interim action remedial units were identified for the soil and groundwater at Site IR-6 as described in Section 6.1 and Table 4.

The remedial alternatives presented in the OU II FS Report were reevaluated for the interim action remedial units for soil and groundwater at IR-6, on the basis of implementability, long-term effectiveness, and cost. The three interim action alternatives that best met the screening criteria, as described and compared in Section 6.0 and Table 6, were:

- No action/institutional action

- Ex situ aerobic biodegradation of soil and collection and discharge of groundwater to the POTW
- Onsite thermal desorption of soil and collection and discharge of groundwater to the POTW.

Of these options, aerobic biodegradation was chosen as the preferred soil remedial alternative because it is the least expensive and because it is expected that this alternative would not require compliance with the substantive requirements of the air permitting process.

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TABLES

Table 1. Chemicals of Concern
OU II Summary Alternative Selection Report
Hunters Point Annex

Chemicals	Site IR-8			Site IR-9			Site IR-6		Site IR-10		Site IR-6/10
	ss	sbs	gw	ss	sbs	gw	ss	sbs	ss	sbs	gw
VOCs											
Benzene			N/A								x
1,2-Dichloroethene			N/A								x
Tetrachloroethene			N/A								x
Trichloroethene			N/A								x
Vinyl chloride			N/A								x
SOCs											
Aldrin			N/A				x				
Aroclor 1260	x	x	N/A				x	x			
4,4'-DDD		x	N/A								
4,4'-DDE		x	N/A								
Pentachlorophenol			N/A								x
cPAHs											
Benzo(a)anthracene	x	x	N/A	x	x		x	x	x	x	
Benzo(a)pyrene	x	x	N/A	x	x	x	x	x	x	x	
Benzo(b)fluoranthene	x	x	N/A	x	x	x	x	x	x	x	
Benzo(k)fluoranthene	x	x	N/A	x		x	x		x	x	
Chrysene	x	x	N/A	x	x		x	x	x	x	
Dibenzo(a,h)anthracene			N/A				x		x		
Indeno(1,2,3-cd)pyrene	x	x	N/A			x	x	x	x		
nPAHs											
Acenaphthene			N/A								x
Anthracene			N/A								x
Fluoranthene			N/A								x
Fluorene			N/A								x
2-Methylnaphthalene			N/A								x
Naphthalene			N/A								x
Phenanthrene			N/A								x
Pyrene			N/A								x
Inorganics/Metals											
Antimony			N/A		(x)	[x]	(x)				[x]
Arsenic	[x]	[x]	N/A	(x)	[x]	[x]	x	[x]	[x]	x	(x)
Barium			N/A								
Beryllium	[x]	[x]	N/A	[x]	[x]		[x]	[x]	(x)	x	[x]
Chromium as chromium III	[x]	[x]	N/A	[x]	[x]		(x)	[x]	[x]	[x]	
Chromium VI			N/A			x					x
Lead			N/A	x	x		x		x		
Manganese	[x]	[x]	N/A	[x]	[x]	[x]	(x)	[x]	[x]	x	(x)
Molybdenum			N/A								(x)
Nickel	[x]	[x]	N/A	[x]	(x)	x	(x)	[x]	[x]	[x]	[x]
Nitrate as nitrogen			N/A			x					

ss = Surface soil; sbs = Subsurface soil; gw = Groundwater.
N/A = Not applicable, groundwater not considered potable.
[x] = The maximum site concentration was less than the interim ambient level in the medium of concern.
(x) = The 95-percent upper-confidence limit of the arithmetic mean was less than the interim ambient level in the medium of concern.

Table 2. Estimated Risks to a Resident Child Receptor
OU II Summary Alternative Selection Report
Hunters Point Annex

Exposure Pathway	Hazard Index /1/ Average /3/	Hazard Index /1/ RME /4/	Potential Upperbound Excess Cancer Risk /2/ Average	Potential Upperbound Excess Cancer Risk /2/ RME
SITE IR-8				
Soil Pathways				
Inhalation of dust in indoor air	4E-01	8E-01	2E-06	1E-05
Inhalation of dust in outdoor air	1E-01	3E-01	5E-07	5E-06
Ingestion of soil	6E-01	1E+00	2E-05	9E-05
Ingestion of fruits grown onsite	1E-01	1E+00	1E-06	2E-05
Ingestion of vegetables grown onsite	9E-02	8E-01	1E-06	2E-05
Dermal contact with soil	5E-02	3E-01	3E-05	4E-04
Multipathway Exposure	**1E+00**	**5E+00**	**5E-05**	**5E-04**
SITE IR-9				
Soil Pathways				
Inhalation of dust in indoor air	4E-01	1E+00	2E-06	1E-05
Inhalation of dust in outdoor air	1E-01	5E-01	6E-07	5E-06
Ingestion of soil	6E-01	2E+00	2E-05	5E-05
Ingestion of fruits grown onsite	3E-01	3E+00	1E-06	2E-05
Ingestion of vegetables grown onsite	2E-01	2E+00	1E-06	2E-05
Dermal contact with soil	6E-02	4E-01	2E-05	8E-05
Groundwater Pathways				
Ingestion of groundwater	3E+00	1E+01	2E-04	2E-03
Dermal contact with groundwater during showering	2E-03	1E-02	2E-03	3E-03
Inhalation of groundwater vapors during showering	--	--	1E-05	7E-05
Multipathway Exposure	**4E+00**	**2E+01**	**3E-03**	**5E-03**
SITE IR-6				
Soil Pathways				
Inhalation of dust in indoor air	3E-01	1E+00	3E-06	2E-05
Inhalation of dust in outdoor air	1E-01	4E-01	1E-06	9E-06
Ingestion of soil	1E+00	3E+00	2E-04	7E-04
Ingestion of fruits grown onsite	3E-01	3E+00	1E-05	1E-04
Ingestion of vegetables grown onsite	2E-01	2E+00	1E-05	1E-04
Dermal contact with soil	1E-01	8E-01	3E-04	4E-03
Multipathway Exposure	**2E+00**	**1E+01**	**5E-04**	**5E-03**

Table 2. Estimated Risks to a Resident Child Receptor
OU II Summary Alternative Selection Report
Hunters Point Annex

Exposure Pathway	Hazard Index /1/ Average /3/	Hazard Index /1/ RME /4/	Potential Upperbound Excess Cancer Risk /2/ Average	Potential Upperbound Excess Cancer Risk /2/ RME
SITE IR-10				
Soil Pathways				
Inhalation of dust in indoor air	4E-01	1E+00	2E-06	1E-05
Inhalation of dust in outdoor air	1E-01	5E-01	6E-07	5E-06
Ingestion of soil	7E-01	2E+00	2E-05	6E-05
Ingestion of fruits grown onsite	2E-01	4E+00	1E-06	3E-05
Ingestion of vegetables grown onsite	2E-01	3E+00	1E-06	4E-05
Dermal contact with soil	6E-02	4E-01	2E-05	1E-04
Multipathway Exposure	**2E+00**	**1E+01**	**4E-05**	**3E-04**
SITES IR-6/10				
Groundwater Pathways				
Ingestion of groundwater	3E+00	1E+01	1E-04	2E-03
Dermal contact with groundwater during showering	1E-01	2E+00	1E-06	8E-05
Inhalation of groundwater vapors during showering	--	--	1E-06	9E-05
Multipathway Exposure	**3E+00**	**1E+01**	**1E-04**	**2E-03**

/1/ Index used to evaluate potential for noncarcinogenic adverse health effects.
/2/ Value used to evaluate potential for cancer risks.
/3/ Average exposure scenario.
/4/ Reasonable maximum exposure scenario.
-- = Pathway not calculable because organic chemicals of concern do not have toxicity values and inorganic chemicals of concern are not volatile.
All numbers have been rounded to one significant figure for presentation purposes (4E-01 = 4 x 10^-1).

Table 3. Estimated Risks to an Adult Office Worker Receptor
OU II Summary Alternative Selection Report
Hunters Point Annex

Exposure Pathway	Hazard Index /1/ Average /3/	Hazard Index /1/ RME /4/	Potential Upperbound Excess Cancer Risk /2/ Average	Potential Upperbound Excess Cancer Risk /2/ RME
SITE IR-8				
Soil Pathways				
Inhalation of dust in indoor air	2E-02	5E-02	1E-07	1E-06
Inhalation of dust in outdoor air	3E-02	1E-01	2E-07	3E-06
Ingestion of soil	2E-02	5E-02	1E-06	8E-06
Dermal contact with soil	9E-03	6E-02	5E-06	1E-04
Multipathway Exposure	**8E-02**	**3E-01**	**6E-06**	**1E-04**
SITE IR-9				
Soil Pathways				
Inhalation of dust in indoor air	1E-02	4E-01	6E-08	8E-07
Inhalation of dust in outdoor air	4E-02	2E-01	2E-07	4E-06
Ingestion of soil	2E-02	6E-02	1E-06	5E-06
Dermal contact with soil	1E-02	7E-02	3E-06	2E-05
Groundwater Pathways				
Ingestion of groundwater	2E-01	4E+00	2E-05	9E-04
Dermal contact with groundwater during showering	7E-04	4E-03	1E-03	1E-03
Inhalation of groundwater vapors during showering	--	--	2E-06	4E-05
Multipathway Exposure	**3E-01**	**5E+00**	**1E-03**	**2E-03**
SITE IR-6				
Soil Pathways				
Inhalation of dust in indoor air	1E-02	4E-02	1E-07	1E-06
Inhalation of dust in outdoor air	3E-02	2E-01	3E-07	6E-06
Ingestion of soil	3E-02	1E-01	8E-06	7E-05
Dermal contact with soil	2E-02	1E-01	5E-05	1E-03
Multipathway Exposure	**9E-02**	**4E-01**	**6E-05**	**1E-03**
SITE IR-10				
Soil Pathways				
Inhalation of dust in indoor air	2E-02	9E-02	1E-07	2E-06
Inhalation of dust in outdoor air	3E-02	2E-01	2E-07	4E-06
Ingestion of soil	2E-02	6E-02	1E-06	5E-06
Dermal contact with soil	1E-02	7E-02	3E-06	4E-05
Multipathway Exposure	**8E-02**	**4E-01**	**4E-06**	**5E-05**
SITES IR-6/10				
Groundwater Pathways				
Ingestion of groundwater	2E-01	5E+00	1E-05	1E-03
Dermal contact with groundwater during showering	5E-02	6E-01	4E-07	4E-05
Inhalation of groundwater vapors during showering	--	--	2E-07	5E-05
Multipathway Exposure	**2E-01**	**6E+00**	**1E-05**	**1E-03**

/1/ Index used to evaluate potential for noncarcinogenic adverse health effects.
/2/ Value used to evaluate potential for cancer risks.
/3/ Average exposure scenario.
/4/ Reasonable maximum exposure scenario.
-- = Pathway not calculable because organic chemicals of concern do not have toxicity values and inorganic chemicals of concern are not volatile.
All numbers have been rounded to one significant figure for presentation purposes (4E-01 = 4 x 10^-1).

Table 4. Soil and Groundwater Interim Action Remedial Units
OU II Summary Alternative Selection Report
Hunters Point Annex

SOIL - Site IR-6	
• Chemicals	Diesel fuel, oil and grease
o Depth	16 feet
o Approximate volume	6,100 cy
• Chemicals	PCBs, cPAHs, lead
o Depth	3 feet
o Approximate volume	900 cy
GROUNDWATER — Site IR-6	
• Chemicals	SOCs, VOCs
o Saturated thickness	13.5 feet
o Approximate volume	30,700 cf
• Chemicals	nPAHs
o Saturated thickness	4 feet
o Approximate volume	4,100 cf

-- = Not applicable.
cf = Cubic feet.
PCBs = Polychlorinated biphenyls.
cy = Cubic yards.
cPAHs = Carcinogenic polycyclic aromatic hydrocarbons.
nPAHs = Noncarcinogenic polycyclic aromatic hydrocarbons.
SOCs = Semivolatile organic compounds.
VOCs = Volatile organic compounds.

Table 5. Maximum Concentrations of Point-Source Chemicals in Groundwater and POTW Acceptance Levels OU II Summary Alternative Selection Report Hunters Point Annex

Chemicals of Concern	Maximum Concentration (mg/l)	POTW Acceptance Levels (mg/l)	Source
Site IR-9			
- Total cPAHs	0.00089	--	NA
- Chromium VI	0.460	5	Order 158170
Site IR-6/IR-10			
- Benzene	0.072	--	NA
- Chromium VI	0.400	5	Order 158170
- 1,2-Dichloroethene (total)	0.140	--	NA
- 2-Methylnaphthalene	0.240	--	NA
- Naphthalene	1.800	--	NA
- Phenanthrene	0.160	--	NA
- Trichloroethene	0.038	204	Title 22
- Vinyl Chloride	0.038	--	NA

-- Chemical not regulated by POTW. For those chemicals for which no acceptance levels are promulgated in City and County of San Francisco Ordinance No. 19-92 or Order No. 158170, the POTW dictates soluble threshold limit concentration (STLC) values listed in California Code of Regulations, Title 22, Section 66261.24 to be used as acceptance levels. The chemicals for which no criteria are posted in the above referenced documents are not regulated by the POTW.

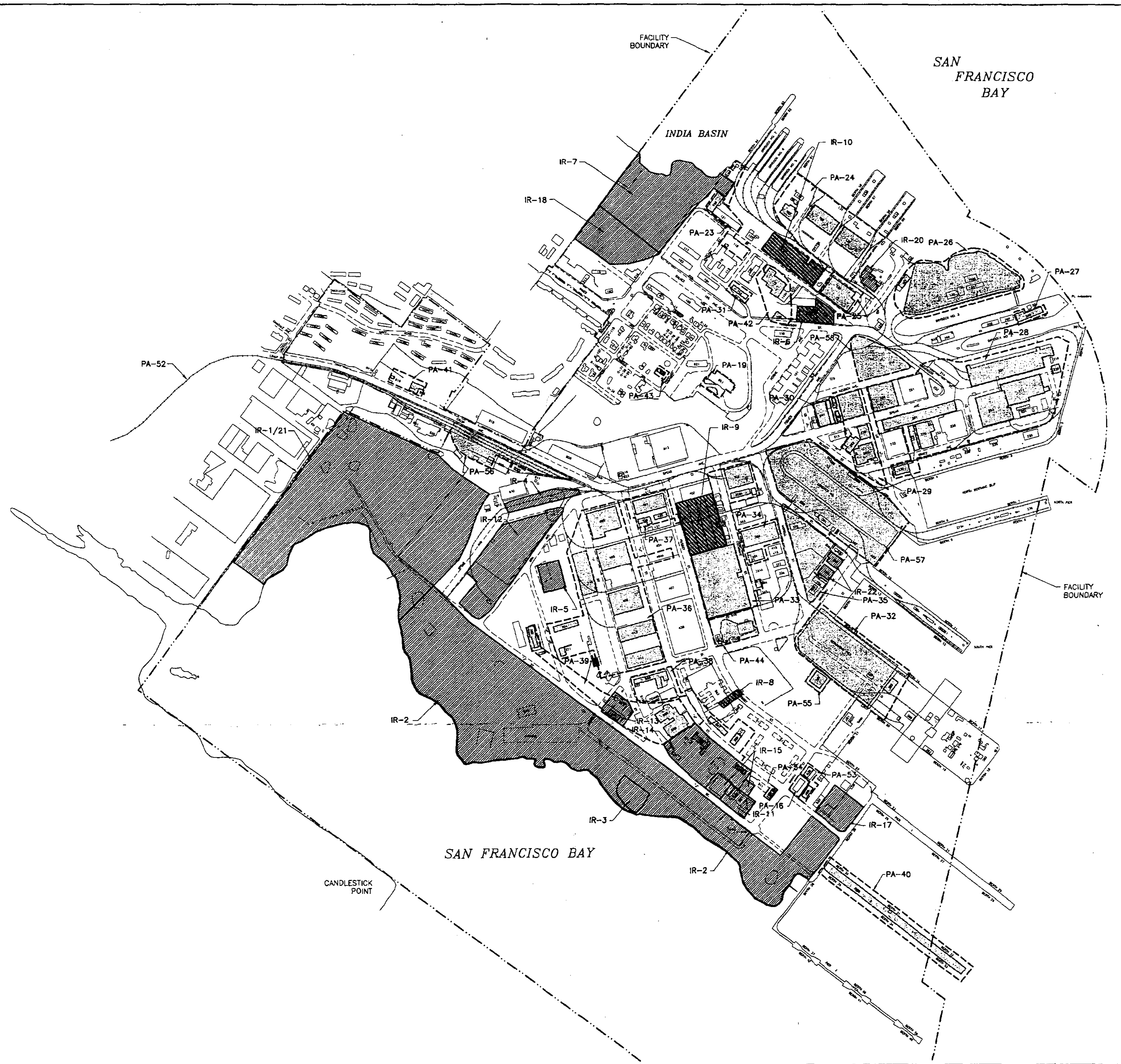
NA Not applicable.

Table 6. Comparison of Interim Action Alternatives for Site IR-6
OU II Summary Alternative Selection Report
Hunters Point Annex

	Interim Action Alternative 1 No Action/ Institutional Action	Interim Action Alternative 2 Ex Situ Aerobic Biodegradation, and Groundwater Collection and Discharge to the POTW	Interim Action Alternative 3 Onsite Thermal Desorption, and Groundwater Collection and Discharge to the POTW
Implementability	Easy to implement	Demonstration of compliance with the substantive requirements of an air permit is not expected to be necessary. Biodegradation equipment is readily available.	Demonstration of compliance with the substantive requirements of an air permit will be necessary. Thermal desorption equipment is readily available.
Estimated Cost (NPV)	$440,000	$2,480,000	$2,580,000
Long-Term Effectiveness	Not effective	Effective Moderately simple system Achieving TRGs for groundwater may be technically impractical	Effective Moderately complex system Achieving TRGs for groundwater may be technically impractical

NPV = Net present value; based on a 5-percent rate of return.
TRG = Target remedial goal.

PLATES



EXPLANATION:

- AREA OF INVESTIGATION IN THIS REPORT
- EXISTING IR SITE
- BUILDING OR AREA IDENTIFIED FOR INVESTIGATION WITHIN A PA SITE
- EXISTING BUILDING
- LOCATION OF FORMER BUILDING
- IR SITE BOUNDARY
- PA SITE BOUNDARY
- CRANE OR RAILROAD TRACKS
- FENCE
- ROADWAY

IR SITE NO.	AREA DESIGNATION
1/21	INDUSTRIAL LANDFILL
2	BAY FILL AREA
3	OIL RECLAMATION PONDS
4	SCRAP YARD
5	OLD TRANSFORMER STORAGE YARD
6	TANK FARM
7	SUB-BASE AREA
8	PCB SPILL AREA
9	PICKLING AND PLATE YARD
10	BATTERY AND ELECTROPLATING SHOP (BUILDING 123)
11	BUILDING 521, POWER PLANT AREA
12	DISPOSAL TRENCH AREA
13	OLD COMMISSARY AREA
14	OILY LIQUID WASTE DISPOSAL AREA
15	OILY WASTE PONDS AND INCINERATION TANK
17	DRUM STORAGE AND DISPOSAL AREA
18	WASTE OIL DISPOSAL AREA
20	BUILDING 156
22	BUILDINGS 368, 369

PA SITE NO.	BUILDING NUMBER/AREA DESIGNATION
16	CONTAINER STORAGE AREA
19	901
23	146, 161, 162
24	124, 125, 128, 130
25	134
26	157, AREA XIV
27	205
28	211/253, 219, 230, 231, 258, 270, 271, 281
29	203, 217, 275, 279, 280, 282
30	241
31	114
32	REGUNNING PIER, 383
33	302, 302A, 304, 364, 411, 418
34	351, 366
35	274, 306, AREA BOUNDED BY MANSEAU, MORELL, AND E STREETS
36	371, 400, 404A, 405, 406, 413, 414, 704, 710, PARTS OF AREA IV
37	401, 423, 435, 436
38	500, 506, 507, 509, 510
39	505, 707
40	527, PIER 2
41	816, 818
42	109, 113
43	906
44	438, AREA NEAR BUILDINGS 408, 409, 410
45*	STEAMLINES
46*	FUEL DISTRIBUTION LINES, TANK FARM
47*	FUEL DISTRIBUTION LINES, TANK S-505
48*	SUSPECTED STEAMLINES, FORMER BUILDING 503
49*	FUEL DISTRIBUTION LINES, BUILDINGS 205, 203
50*	STORM DRAIN AND SANITARY SEWER LINES
51*	FORMER TRANSFORMER SITES
52	RAILROAD RIGHT-OF-WAY
53	525, 530
54	511A
55	307
56	AREA VII, RAILROAD TRACKS
57	DRYDOCK 4 AREA
58	SCRAP YARD ACROSS FROM BUILDING 528
*	NOT SHOWN

400 0 400 800
SCALE IN FEET

DRAWN: JEB	PROJECT NO: 11400 0817		
ENGINEER:	SCALE: 1" = 400'		
CHECKED:	APPROVED: BPF		
DATE:	DATE: 5/14/93		
NO. DATE	REVISIONS	BY	CHK

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San Francisco, California

HPA FACILITY MAP

PLATE 1
SHEET: OF
REVISION NUMBER:
DATE:

EXPLANATION:

RI SAMPLING LOCATIONS

- IR08MW37A — A-AQUIFER MONITORING WELL
- IR08B019 — SOIL BORING
- IR08P39A — PIEZOMETER

PRE-RI SAMPLING LOCATIONS

- W-2 — SELECTED ERM-WEST MONITORING WELL
- X-1 — SELECTED ERM-WEST SAMPLE LOCATION

- 506 — EXISTING BUILDING
- 517 — LOCATION OF FORMER BUILDING
- 509 — FORMER BUILDING LOCATION BEING INVESTIGATED AS PART OF A PA
- POWER POLE
- APPROXIMATE LOCATION OF PRIOR EXCAVATION; FROM "SUMMARY REPORT, INTERIM CLEANUP OF PCB CONTAMINATED SOILS NEAR FORMER BUILDING 503" (ERM-WEST, 1989)
- IR SITE BOUNDARY
- PA SITE BOUNDARY
- APPROXIMATE AREA OF SOIL CONTAMINATION RELATED TO POINT-SOURCE RELEASES; QUERIED WHERE UNCERTAIN
- APPROXIMATE AREA OF GROUNDWATER CONTAMINATION RELATED TO POINT-SOURCE REASES; QUERIED WHERE UNCERTAIN
- APPROXIMATE GROUNDWATER FLOW DIRECTION

NOTE:

AREA OF SOIL CONTAMINATION BASED ON DETECTABLE CONCENTRATIONS OF PCBs IN SOIL SAMPLES.

AREA OF GROUNDWATER CONTAMINATION BASED ON DETECTABLE CONCENTRATIONS OF PCBs IN GROUNDWATER.

ADDITIONAL INFORMATION ON THE DISTSRIBUTION OF CHEMICALS IN SOIL WITH DEPTH IS PRESENTED IN THE OU II RI REPORT (HLA, 1992h).

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SCALE IN FEET

NO.	DATE	REVISIONS	BY	CHK

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DATE:	DATE: 5/14/93

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DISTRIBUTION OF POINT-SOURCE CHEMICALS IN SOIL AND GROUNDWATER, IR-8

PLATE 2
SHEET: OF
REVISION NUMBER: 0
DATE:

EXPLANATION:

HLA RI SAMPLING LOCATIONS

- IR09MW31A — A-AQUIFER MONITORING WELL
- IR09B007 — SOIL BORING
- IR09P041 — PIEZOMETER
- WP.1 — WIPE SAMPLE
- RES.1 — RESIDUE SAMPLE
- 419 — LOCATION OF EXISTING BUILDING
- 304 — EXISTING BUILDING BEING INVESTIGATED AS PART OF A PA
- FORMER DRYING/PLATE RACK AREAS
- IR SITE BOUNDARY
- PA SITE BOUNDARY
- APPROXIMATE AREA OF SOIL CONTAMINATION RELATED TO POINT-SOURCE RELEASES; QUERIED WHERE UNCERTAIN
- APPROXIMATE AREA OF GROUNDWATER CONTAMINATION RELATED TO POINT-SOURCE RELEASES; QUERIED WHERE UNCERTAIN
- APPROXIMATE GROUNDWATER FLOW DIRECTION

NOTE:

AREA OF SOIL CONTAMINATION BASED ON DETECTABLE CONCENTRATIONS OF HEXAVALENT CHROMIUM IN SOIL SAMPLES

AREA OF GROUNDWATER CONTAMINATION BASED ON DETECTABLE CONCENTRATIONS OF HEXAVALENT CHROMIUM IN GROUNDWATER.

ADDITIONAL INFORMATION ON THE DISTRIBUTION OF CHEMICALS IN SOIL WITH DEPTH IS PRESENTED IN THE OU II RI REPORT (HLA, 1992h).

60 0 60 120
SCALE IN FEET

NO.	DATE	REVISIONS	BY	CHK

DRAWN: JEB | PROJECT NO: 11400 0817
ENGINEER: | SCALE: 1"=60'
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DISTRIBUTION OF POINT-SOURCE CHEMICALS IN SOIL AND GROUNDWATER, SITE IR-9

PLATE 3
SHEET: OF
REVISION NUMBER:
DATE:

EXPLANATION:

RI SAMPLING LOCATIONS

- IR10MW14A A–AQUIFER MONITORING WELL
- IR06MW47F BEDROCK MONITORING WELL
- IR10B019 SOIL BORING
- IR10P01 PIEZOMETER
- IR06SS19 SURFACE SOIL SAMPLE

PRE–RI SAMPLING LOCATIONS

- EB–33 LOWNEY–KALDVEER BORING
- BE02 SUMP SAMPLE

- EXISTING BUILDING
- EXISTING BUILDING BEING INVESTIGATED AS PART OF A PA
- LOCATION OF FORMER BUILDING
- 286–BARREL DIESEL STORAGE TANK
- FORMER TANKS ASSOCIATED WITH BUILDING 124, FORMER ACID MIXING PLANT
- LUBE OIL TANK
- LUBE OIL TANK SUPPORT RACK AREA
- MAIN TRUNK LINE OF ACID DRAIN SYSTEM
- IR SITE BOUNDARY
- PA SITE BOUNDARY
- APPROXIMATE AREA OF SOIL CONTAMINATION RELATED TO POINT–SOURCE RELEASES; QUERIED WHERE UNCERTAIN
- APPROXIMATE AREA OF GROUNDWATER CONTAMINATION RELATED TO POINT–SOURCE RELEASES; QUERIED WHERE UNCERTAIN
- APPROXIMATE GROUNDWATER FLOW DIRECTION

NOTE:

AREA OF SOIL CONTAMINATION BASED ON DETECTABLE CONCENTRATIONS OF TCE, PCE, AND PCBs, CONCENTRATIONS OF TPH AS DIESEL AND TOTAL OIL AND GREASE ABOVE 100 mg/kg AND CONCENTRATIONS OF LEAD AND ZINC ABOVE INTERIM AMBIENT LEVELS IN SOIL SAMPLES.

AREA OF GROUNDWATER CONTAMINATION BASED ON DETECTABLE CONCENTRATIONS OF 1,2–DCE, -TCE, 1,2–PCE, VINYL CHLORIDE, BENZENE, ETHYLBENZENE, XYLENES AND NONCARCINOGENIC PAHs IN GROUNDWATER SAMPLES.

ADDITIONAL INFORMATION ON THE DISTRIBUTION OF EACH OF THE CHEMICALS USED IN DEFINING THE AREA OF CONTAMINATION IS PROVIDED IN THE OU II RI REPORT (HLA, 1992h).

60 0 60 120
SCALE IN FEET

NO.	DATE	REVISIONS	BY	CHK		
					DRAWN: JEB	PROJECT NO: 11400 0817
					ENGINEER:	SCALE: 1"=60'
					CHECKED:	APPROVED: BPF
					DATE:	DATE: 5/14/93

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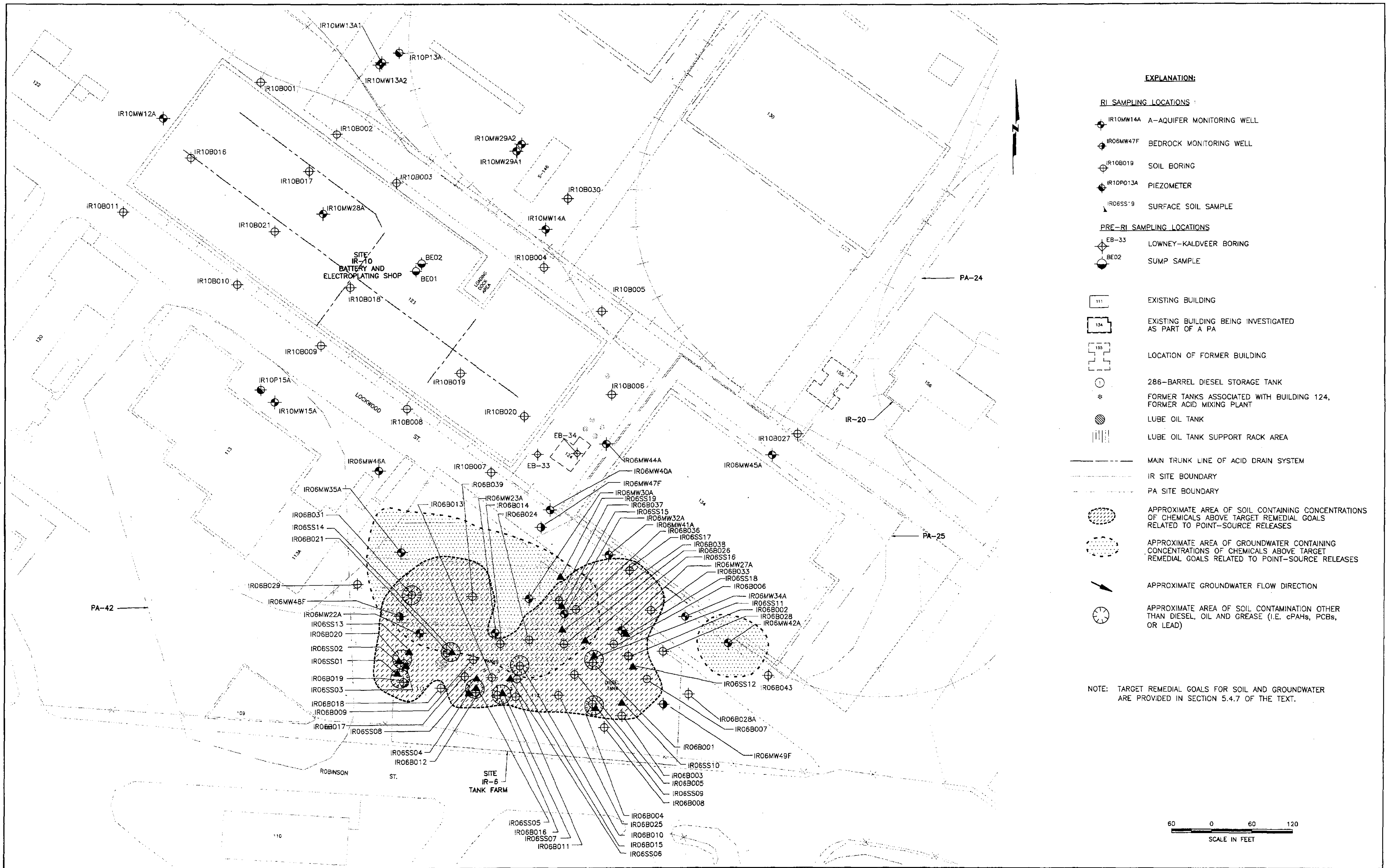
Naval Station Treasure Island
Hunters Point Annex
San Francisco, California

DISTRIBUTION OF POINT–SOURCE CHEMICALS IN SOIL AND GROUNDWATER, SITES IR–6 & IR–10

PLATE 4
SHEET: OF
REVISION NUMBER:
DATE:



NO.	DATE	REVISIONS	BY	CHK

DRAWN: JEB | PROJECT NO: 11400 0817
ENGINEER: | SCALE: 1" = 60'
CHECKED: | APPROVED: MG
DATE: | DATE: 5/11/93

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INTERIM ACTION REMEDIAL UNITS
SITE IR-6

PLATE 5
SHEET: OF
REVISION NUMBER:
DATE:

APPENDIX A

TARGET REMEDIAL GOAL CALCULATION METHODS FOR COMMERCIAL USE SCENARIO

A1.0 Target Remedial Goal Calculations: Aroclor 1260 and cPAHs in Soil at Site IR-6

Target remedial goals (TRGs) for Aroclor 1260 and total cPAHs in soil at Site IR-6 were estimated for the commercial scenario from the baseline risks summarized in Table A1. At Site IR-6, dermal contact with soil contributes most significantly to overall risk estimates for the commercial worker exposure scenarios considered in the PHEE. Chemicals contributing most to estimated risks for this receptor at this site are Aroclor 1260 and cPAHs. Calculation of the baseline risks are explained in the Draft OU II PHEE report (*HLA, 1992k*).

For an individual pathway and one chemical or group of chemicals, and given a baseline concentration and baseline and target risks, an initial estimate of the TRG concentration follows from Equation 1-1.

$$\text{TRG Concentration} = \frac{\text{Target Risk}}{\text{Baseline Risk}} \times C_S \qquad \text{(Equation 1-1)}$$

where:

TRG Concentration	=	Initial estimated TRG concentration in soil for carcinogens based on target risk.
C_S	=	Baseline soil concentration for RME scenario, as calculated in PHEE report (Table 8-4).
Target Risk	=	Target risk criterion; set at 1×10^{-4}
Baseline Risk	=	Baseline cancer risk for RME scenario, as estimated in PHEE report (Appendix F Tables).

As an example of application of Equation 1-1, baseline concentrations and risks are shown in Table A2 for Aroclor 1260 and cPAHs for dermal contact with soil at Site IR-6. Setting the target risk equal to 1×10^{-4} (the upper end of the EPA target risk range and the residual risk objective for this ASR) yields the initial estimates of TRG concentrations shown in Table A2.

The assumptions for the initial estimate of TRGs based on Equation 1-1 are that only one chemical or one pathway contributes to the risk. If there are multiple pathways or multiple chemicals, however, residual risk would exceed 1×10^{-4}. When the estimated residual risk exceeds 1×10^{-4} based on initial estimates of TRGs, a revised target risk for a chemical or chemical group can be estimated by dividing the original target risk by the total number of pathways and chemicals contributing significantly to the target risk for that medium at that site. For example, dermal contact with Aroclor 1260 and total cPAHs in soil make the most significant contributions to risk from point sources at Site IR-6. Therefore the number of pathways is one and the total number of chemicals is two. Based on Equation 1-1, the initial TRG estimate divided by 2 results in TRG concentrations of 2.0 and 2.5 mg/kg for Aroclor 1260 and cPAHs, respectively.

Table A1. Baseline Risks from Multipathway Exposures of Soil, Site IR-6 /a/
OU II FS Report
Hunters Point Annex

Receptor Population Exposure Pathway	Hazard Index Average	 RME	Potential Upper Bound Excess Cancer Risk Average	 RME
Future Hypothetical Onsite				
Construction Workers /a/				
Inhalation of dust in outdoor air	1E-01	5E+00	2E-07	9E-06
Ingestion of soil	4E-02	1E+00	1E-05	3E-05
Dermal contact with soil	3E-03	4E-01	1E-06	1E-04
Multipathway Exposures	**2E-01**	**7E+00**	**1E-05**	**1E-04**
Future Hypothetical Onsite				
Adult Office Workers				
Inhalation of dust in indoor air	1E-02	4E-02	1E-07	1E-06
Inhalation of dust in outdoor air	3E-02	2E-01	3E-07	6E-06
Ingestion of soil	3E-02	1E-01	8E-06	7E-05
Dermal contact with soil	2E-02	1E-01	5E-05	1E-03
Multipathway Exposures	**9E-02**	**4E-01**	**6E-05**	**1E-03**
Future Hypothetical Onsite				
Child/Adult Residents				
Inhalation of dust in indoor air	3E-01	1E+00	3E-06	2E-05
Inhalation of dust in outdoor air	1E-01	4E-01	1E-06	9E-06
Ingestion of soil	1E+00	3E+00	2E-04	7E-04
Ingestion of fruits	3E-01	3E+00	1E-05	1E-04
Ingestion of vegetables	2E-01	2E+00	1E-05	1E-04
Dermal contact with soil	1E-01	8E-01	3E-04	4E-03
Multipathway Exposures	**2E+00**	**1E+01**	**5E-04**	**5E-03**
Future Hypothetical Onsite				
Adult Residents				
Inhalation of dust in indoor air	6E-02	2E-01	7E-07	1E-05
Inhalation of dust in outdoor air	4E-03	2E-02	5E-08	1E-06
Ingestion of soil	9E-02	3E-01	2E-05	2E-04
Ingestion of fruits	4E-02	5E-01	2E-06	4E-05
Ingestion of vegetables	8E-02	1E+00	4E-06	9E-05
Dermal contact with soil	3E-02	2E-01	7E-05	2E-03
Multipathway Exposures	**3E-01**	**2E+00**	**1E-04**	**2E-03**

1E-01 = 1 x 10^-1

All figures rounded to one significant figure for discussion purposes.

/a/ Based on the OU II PHEE results (HLA, 1992j).

Table A2. Target Remedial Goals in Soil to be Protective of Adult Office Workers for the Dermal Contact with Soil Pathway, Site IR−6
OU II FS Report
Hunters Point Annex

Chemical	RME Scenario − Adult Office Workers			
	Baseline Concentration /a/ (mg/kg)	Target Risk /b/	Baseline Risk /b/	TRG Concentration /c/
Aroclor 1260	4.01E+01	1.00E−04	9.19E−04	4.36E+00
Total cPAHs	9.68E+00	1.00E−04	1.67E−04	5.80E+00

/a/ From OU II PHEE report, Table F30 (HLA, 1992j).

/b/ From OU II PHEE report, Table F30 (HLA, 1992j).

/c/ TRG Concentration = Target Risk/Baseline Risk x Baseline Concentration.

APPENDIX B

GROUNDWATER EXTRACTION CALCULATION REVISION (SITE IR-6)

Table B1. Revised Estimated Cleanup Time for Site IR-6 Naphthalene Contaminant Plume OU II Summary Alternative Selection Report Hunters Point Annex

	Minimum Cleanup Time Scenario	Maximum Cleanup Time Scenario
Pore Volumes Removed to Reach MCL:	1.19	4.31
Time Required to Reach MCL (years):	0.80	2.90
<u>Soil Flush Model Equation</u>		
t(sec) = $VRn/Q[\ln(C_w/C_{winit})]$	25285319.65	91443545.87
R = $1+((K_d\, P_b)/n)$	1.47	3.59
P_b = $P_s(1-n)$	1.792	1.792
P_s	2.8	2.8
<u>Model Input</u>		
n (porosity)[1]	0.36	0.36
K_d	0.094[2]	0.52 "oily"[3]
C_w ($\mu g/cm^3$)[4]	0.542	0.542
C_{winit} ($\mu g/cm^3$)	1.22 "Average"[5]	1.8 "Max"[6]
V (cm^3)[7]	4.60E+08	4.60E+08
Q (cm^3/s)[8]	7.8	7.8

1 Porosity is average of site values from Table 47, OU II RI Report (*HLA, 1992h*).

2 K_d = Naphthalene distribution coefficient for soil without petroleum hydrocarbons. Table J12, OU II RI Report.

3 K_d = Naphthalene distribution coefficient for soil with petroleum hydrocarbons. f(oil) = 0.00011, f(oil) is calculated average TOG or TPH soil value from wells or borings within the plume.

4 Final concentration (C_w) is tHBLn of 542 $\mu g/l$.

5 Naphthalene plume initial concentration (C_{winit}) is the average concentration calculated from plume water analysis.

6 Naphthalene plume initial concentration (C_{winit}) is assumed to be the largest concentration observed within the plume.

7 Naphthalene plume volume (V) defined by an area of 4,088 square feet and an aquifer thickness of 4 feet.

8 Groundwater extraction rate of 0.125 gpm based on water sampling purge and recovery data.

APPENDIX C

DESCRIPTIONS OF ALTERNATIVES AND SELECTION OF INTERIM ACTION ALTERNATIVES

APPENDIX C

The eight alternatives presented in the OU II FS Report are briefly described below, and are then subjected to the selection criteria described in Section 6.4 for selection of an interim action alternative (*HLA, 1992l*).

DESCRIPTION OF ALTERNATIVES PRESENTED IN OU II FS REPORT

OU II FS Alternative 1 — No Action/Institutional Action

This alternative is required under CERCLA to be evaluated as a baseline against which others must be compared. Alternative 1 would consist of taking no further action to treat or contain chemical-bearing soil and groundwater and would be implemented in conjunction with institutional actions such as monitoring programs, deed restrictions, and fencing off the site.

OU II FS Alternative 2 — Capping

This alternative consists of removal of the existing pavement and installation of a cap over the soil remedial unit. Although the chemical-bearing soil would remain in place, capping would reduce the risks associated with exposure to the soil as well as further migration of chemicals due to infiltration.

OU II FS Alternative 3 — Excavation and Disposal of Soil at a Class I and/or Class II Landfill

This alternative consists of excavation and disposal of the soil at a Class I or II landfill. This alternative would achieve the soil TRGs.

OU II FS Alternative 4 — Onsite Ex Situ Soil Washing with Replacement of Treated Soil Onsite

This alternative consists of excavation and treatment of petroleum-hydrocarbon-bearing soil in an onsite engineered soil-washing unit with disposal of hotspots at a

Class I landfill. Following treatment and analytical verification that the soil TRGs have been met, the soil would be replaced in the excavated area. Waste generated by the washing process would also be disposed at a Class I or II landfill.

<u>OU II FS Alternative 5 — Onsite Ex Situ Aerobic Biodegradation with Replacement of Treated Soil Onsite</u>

This alternative consists of excavation and onsite biological treatment of petroleum-hydrocarbon-bearing soil, with disposal of hotspots at a Class I landfill. Following treatment and analytical verification that the soil TRGs have been met, the soil would be replaced in the excavated area.

<u>OU II FS Alternative 6 — Excavation and Offsite Thermal Treatment at an Asphalt Batching Facility with Replacement of Treated Soil Onsite</u>

This alternative consists of excavation and treatment of the soil in an offsite thermal separator at an asphalt batching facility. The heat treatment process separates the petroleum hydrocarbons from the contaminated soil and produces engineered fill. Following treatment and analytical verification that the soil TRGs have been met, the soil would be transported back to the site and replaced in the excavated area.

<u>OU II FS Alternative 7 — Onsite Thermal Desorption with Replacement of Treated Soil Onsite</u>

This alternative consists of excavation and treatment of the soil in an onsite thermal desorption unit. Following treatment and analytical verification that the soil TRGs have been met, the soil would be replaced into the excavated area.

<u>OU II FS Alternative 8 — Excavation and Offsite Thermal Treatment in a Cement Kiln Incinerator</u>

This alternative consists of excavation and treatment of soil in an offsite cement kiln incinerator. The chemical-bearing soil would be incorporated into cement products and recycled, and the excavated area would be filled with engineered backfill material.

SELECTION OF AN INTERIM ACTION ALTERNATIVE

The criteria used to select two preferred interim action alternatives from the above eight are described in Section 6.4.

The results of the selection process are summarized below for each of the eight alternatives. Except for Alternative 1, all eight include groundwater collection and disposal as described above; thus, the comparison of alternatives does not include a discussion of these parameters, but focuses on comparison of the soil remedial alternatives. The costs given below for each of the OU II FS alternatives were based on the remediation of Sites IR-6 and IR-10 to residential TRGs. These are different from the interim action remedial units and TRGs presented in the main text, and are presented for comparison purposes in the selection process.

- **OU II FS Alternative 1 - No action/institutional action** with continued monitoring of chemicals in the groundwater and site access controls. Cost: $1,000,000.

  This alternative was considered an appropriate interim action and a baseline against which to compare the other alternatives.

- **OU II FS Alternative 2 - Capping** of soil. Cost: $2,900,000.

  Capping is a proven technology; however, it would not reduce the toxicity or volume of contaminants in the soil. Also, it would not be a cost-effective interim action or effective as a long-term remediation if further remediation were required on a facility- or parcel-wide basis. Therefore, capping was eliminated from further consideration.

- **OU II FS Alternative 3 - Excavation** of soil and offsite disposal at a Class I or II landfill. Cost: $8,700,000.

  Although excavation and disposal are proven technologies, they would not reduce the toxicity or volume of contaminants in the soil but would merely transfer the contaminated soil to a landfill. In addition, they are much more expensive than some of the other alternatives. Therefore, this alternative was eliminated from further consideration.

- **OU II FS Alternative 4 - Onsite soil washing**, replacement of treated soil onsite, and disposal of concentrated soil residuals and hotspots offsite at a Class I landfill. Cost: $9,700,000.

Soil washing is an innovative but not a proven technology for treating contaminated soil and thus not as readily available as other alternatives. It would require extensive treatability studies up to a year long, and would be the most expensive of the eight alternatives; therefore, it was eliminated from further consideration.

- **OU II FS Alternative 5 - Onsite ex situ aerobic biodegradation** of petroleum-hydrocarbon-bearing soil, replacement of treated soil onsite, and offsite disposal of hotspots at a Class I landfill. Cost: $5,600,000.

  Aerobic biodegradation is a proven technology and would reduce the toxicity, mobility, and volume of contaminated soil. In addition, it is the most cost-effective treatment alternative and would require a minimal treatability study of 4 to 6 weeks; preliminary data have already been evaluated and indicates favorable soil conditions for biodegradation. This alternative would probably not require a treatment permit and could potentially be integrated into facility- or parcel-wide remediation efforts. Therefore, it was retained for further consideration.

- **OU II FS Alternative 6 - Offsite thermal treatment of petroleum-hydrocarbon-bearing soil at an asphalt batching facility**, replacement of treated soil onsite, and offsite disposal of hotspots at a Class I landfill. Cost: $5,700,000.

  Offsite thermal treatment at an asphalt batching facility is a proven technology, but its availability is limited to one facility in California. Organic compounds would be recovered from the soil for use in asphalt production, producing a treated soil. Therefore, this form of treatment would reduce the toxicity, mobility, and volume of the contaminated soil. Although this alternative is one of the least expensive, the availability of the technology could change if the facility becomes nonoperational and/or their permit is revoked. In addition, the facility has limited capacity; thus, soil would have to be stockpiled and transported on a monthly basis, which would increase the cost and duration of remediation. The high moisture content of the soil may affect the recovery efficiency of this technology. For these reasons, this alternative was eliminated from further consideration.

- **OU II FS Alternative 7 - Onsite thermal desorption** of petroleum-hydrocarbon-bearing soil, replacement of treated soil onsite, and offsite disposal of hotspots at a Class I landfill. Cost: $6,300,000.

  Thermal desorption is a proven technology available in California. This alternative would reduce the toxicity, mobility, and volume of contaminated soil and is one of the less expensive alternatives. A minimal treatability study of 2 weeks would be required. Additionally, an air permit would be necessary and is expected to required 3 to 6 months to secure. Therefore, it was retained for further consideration.

- **OU II FS Alternative 8 - Offsite thermal treatment of petroleum-hydrocarbon-bearing soil in a cement kiln incinerator**, placement of engineered backfill material in the excavated area, and offsite disposal of hotspots at a Class I landfill. Cost: $5,800,000.

  Offsite cement kiln incineration is a proven recycling technology; however, its availability is limited to one facility in California. During the last two years, this facility has been nonoperational on several occasions when their permit to operate was temporarily revoked. Although the soil would be recycled, and this is one of the less expensive alternatives, the availability of the California facility in the future is questionable. Therefore, eliminated from further consideration.

The following three alternatives were chosen for interim action. The estimated costs of implementing the three chosen alternatives and the detailed analysis for the interim action remedial unit (Site IR-6) are presented in Section 6.5 and Table 6.

- Interim Action Alternative 1 - No action/institutional action.
- Interim Action Alternative 2 - Onsite ex situ aerobic biodegradation with replacement of treated soil onsite and groundwater extraction and discharge to the POTW.
- Interim Action Alternative 3 - Onsite thermal desorption with replacement of treated soil onsite and groundwater extraction and discharge to the POTW.

APPENDIX D

COST TABLES FOR INTERIM ACTION ALTERNATIVES 1, 2 AND 3

Table D1. Site IR-6 — Cost of Interim Action Alternative 1
No Action/Institutional Action
OU II Summary Alternative Selection Report
Hunters Point Annex

Item	Units	Cost per Unit	Total
Capital Costs			
Deed restrictions	1 each	20,000	$20,000
			$20,000
Engineering	15 %		$ 3,000
Permitting/regulatory interaction	10 %		$ 2,000
Capital costs			$25,000
Capital cost contingency	20 %		$ 5,000
Total capital costs			$30,000
Annual O&M			
Groundwater sampling, analysis, reporting	1 each		$78,300
Yearly O&M			$78,300
O&M PV for 5 years at 5% ROR			$339,000
NPV cost contingency	20 %		$ 68,000
Total NPV O&M costs			$407,000
TOTAL COST			$440,000

NPV = Net present value.

ROR = Rate of return.

Total costs on all tables are rounded to the nearest $10,000.

Table D2. Site IR-6 — Cost of Interim Action Alternative 2
Excavation and Biotreatment with Groundwater Extraction and Discharge
OU II Summary Alternative Selection Report
Hunters Point Annex

Item	Total Cost
Capital Costs	
Mobilization and site preparation	
- Site preparation, biotreatment pad, piping, and mobilization	$ 30,000
- Monitoring well destruction, installation, and groundwater collection trench.	61,000
Excavation and sampling	$159,000
Hotspot disposal	$340,000
Treatment and backfill of soil	
- Transportation of hotspots, biotreatment, and verification sampling	$589,000
- Backfill with treated and borrowed fill	$114,000
Groundwater extraction and POTW discharge systems	$40,000
Surface water control	$100,000
Engineering and regulatory costs	$ 171,000
Subtotal Capital Costs	$1,594,000
Capital contingency (20%)	$ 318,000
TOTAL CAPITAL COST	$1,920,000
Annual O&M	
Groundwater monitoring and POTW discharge	$108,000
O&M PV for 5 years at 5% ROR	$467,000
PV O&M cost contingency (20%)	$ 93,000
TOTAL NPV O&M	$560,000
TOTAL COST	$2,480,000

Table D3. Site IR-6 — Cost of Interim Action Alternative 3
Excavation and Thermal Desorption with Groundwater Extraction and Discharge
OU II Summary Alternative Selection Report
Hunters Point Annex

Item	Total Cost
Capital Costs	
Mobilization and site preparation	
- Site preparation, biotreatment pad, piping, and mobilization	$ 15,000
- Monitoring well destruction, installation, and groundwater collection trench	61,000
Excavation and sampling	$159,000
Hotspot disposal	$340,000
Treatment and backfill of soil	
- Transportation, treatment, and verification sampling	$674,000
- Backfill with treated and borrowed fill	$114,000
Groundwater extraction and POTW discharge systems	$ 40,000
Surface water control	$100,000
Engineering and regulatory costs	$ 180,000
Subtotal Capital Costs	$1,683,000
Capital Contingency (20%)	$ 337,000
TOTAL CAPITAL COST	$2,020,000
Annual O&M	
Groundwater monitoring and POTW discharge	$108,000
O&M PV for 5 years at 5% ROR	$467,000
PV O&M cost contingency (20%)	$ 93,000
TOTAL NPV O&M	$560,000
TOTAL COST	$2,580,000

APPENDIX E

NAVY RESPONSES TO AGENCY COMMENTS ON DRAFT SUMMARY ALTERNATIVE SELECTION REPORT OPERABLE UNIT II

NAVY RESPONSES TO AGENCY COMMENTS
ON
DRAFT SUMMARY ALTERNATIVE SELECTION REPORT
OPERABLE UNIT II

The following are the Navy's responses to the comments of the United States Environmental Protection Agency, Region XI (EPA), the California Environmental Protection Agency, Department of Toxic Substance Control (DTSC) and the California Regional Water Quality Control Board, San Francisco Bay Region (RWQCB) on the Draft Summary Alternative Selection Report, Operable Unit II, Naval Station, Treasure Island, Hunters Point Annex, San Francisco, California. The agency comments are reproduced here exactly as in the original documents.

Note that a discussion of ARARs has been added as Section 4.0 of the report and subsequent sections have been renumbered. Therefore responses to regulatory agency references to Sections 4.0 et seq. refer to the renumbered sections.

I DTSC COMMENTS AND NAVY RESPONSES

A. General Comments

Comment 1: **Overall the report is well organized, however, an executive summary should be included summarizing any selected interim actions.**

Response: An executive summary which discusses selected interim actions has been added.

Comment 2: **It is misleading to indicate that this report assesses environmental risks as only human health risks are evaluated. It should be noted that ecological risks cannot be evaluated at this time as the majority of the ecological studies are not complete. The report should state that ecological risks will be assessed in the site or parcel-wide Remedial Investigation (RI)/Feasibility Study (FS). Ecological data may, however, be available for inclusion in the OU I ASR. The Department is willing to discuss utilizing the ecological data in the decision-making for OU I.**

Response: The text of Section 2.0 has been expended and clarified to address this point. Environmental risks could be assessed when considering potential interim actions. However, because ecological data are not available and associated ARARs have not been agreed on, the OU II ASR considers human health risks and not environmental risks as the basis for evaluating the need and opportunity for interim action.

Comment 3: **Include the rationale for assessing only point sources at this time, when discussing non-point and point sources at the beginning of the report. Clarify that a full assessment of risk, irregardless of source, will be fully evaluated in the site or parcel-wide RI/FS. The groundwater exposure pathway must also be fully evaluated in the site or parcel-wide risk assessment (incorporated in the RI/FS), as groundwater contamination has not been adequately defined.**

Response: Point and nonpoint sources are defined in Section 2.2. The rationale for addressing point sources in the ASR is also presented. The Navy's intention to complete parcel-based RI/FSs was noted in the draft report at the end of Section 2.0 and has been further clarified. Parcel-based RI/FS reports would consider all RI data collected at HPA in evaluating the need for and types of final actions.

Comment 4: **Pumping and piping contaminated groundwater to the Public Owned Treatment Works (POTW) may be an acceptable short-term alternative if discharge levels, from point and non-point sources, are acceptable to the POTW. However, as discussed in the Department's OU II FS comments (dated 11/30/92), groundwater treatment options should also be discussed in this ASR.**

Response: Maximum concentrations of chemicals in groundwater at Site IR-6 from both point and nonpoint sources are below POTW acceptance limits. Table 5 of the ASR shows the target chemicals in groundwater at Site IR-6, their maximum concentrations, and the corresponding acceptance limits at the POTW. Groundwater treatment options were discussed in the OU II FS; the text has been expanded to further document the results of the initial screening of groundwater treatment technologies and groundwater treatment in Section 6.3.2. The results are also presented here.

Groundwater treatment would necessitate two stages of treatment: pretreatment to reduce the hardness of the groundwater, and additional treatment to remove organic constituents.

The high hardness of the groundwater presents a significant operational problem for both types of organic treatment methods considered feasible, and would cause significant scaling of process equipment. To minimize scaling, pH adjustment, and softening pretreatment would be required to remove some of the hardness. Softening would include lime/soda ash softening, postsoftening treatment by granular media filtration, and sludge handling including thickening and dewatering (see Figure E1). One drawback of softening would be the increase in concentration of some of the constituents in the wastewater stream, such as sulfates, TDS, and potentially chlorides.

The primary treatment options considered effective and feasible for the Site IR-6 groundwater remedial unit are (1) air stripping with vapor-phase GAC and resin adsorption offgas treatment, and liquid-phase GAC polishing, and (2) advanced oxidation process (UV/hydrogen peroxide) with liquid-phase GAC polishing. A conceptual treatment train utilizing these processes is shown in Figure E1. These treatment options address the range of organic constituents of concern including naphthalene, vinyl chloride, TCE, and 1,2-DCE. These constituents have a large range of volatilities and adsorption characteristics. Vinyl chloride, TCE and 1,2 DCE are all volatile and can be easily removed from the groundwater by air stripping; naphthalene (an SOC) is not very volatile and will not be removed to an appreciable extent by air stripping. Naphthalene and TCE will adsorb to GAC, but vinyl chloride and 1,2-DCE have poor adsorption characteristics, and will pass through a GAC adsorption unit largely unaffected. All of the organic constituents of concern are oxidizable to an appreciable extent in an advanced oxidation process.

In the first treatment option, air stripping would remove most of the VOCs and some of the SOCs from the groundwater. SOCs not removed in the air stripper would be removed by the liquid-phase GAC polishing unit. The total organic discharge to the atmosphere from the air stripper would be less than a pound per day, which potentially exempts the stripper from offgas treatment under BAAQMD permit requirements. A risk evaluation would have to be performed to show that the risk posed by the TCE, vinyl chloride, and benzene emitted was acceptable. If offgas treatment were determined to be necessary, stripped VOCs in the air stripper offgas would be run through vapor phase carbon to capture most constituents and to reduce the load to the resin adsorption unit. Vinyl chloride that passes through the vapor-phase GAC unit, as well as some other compounds with low adsorption affinity such as DCE, would be captured by the resin adsorption system.

Under the second treatment option, organic constituents would be oxidized by a combination of ultraviolet (UV) light and hydrogen peroxide. The organic chemicals would be oxidized to carbon dioxide, water, and other harmless constituents. Any constituents not fully oxidized would be removed by the liquid-phase GAC polishing unit before discharge.

The proposed treatment train could meet discharge requirements for the POTW and could potentially meet discharge requirements for surface water (ocean) discharge; however, NPDES permit discharge limits for storm drain discharge or agricultural use discharge limits could not be met without further treatment of sulfates and chlorides. These latter limits could potentially be met by further treatment using either evaporation or reverse osmosis.

Residuals generated by the conceptual treatment train (Figure E1) include lime/soda softening sludge (probably nonhazardous), filter backwash sludge (probably nonhazardous), spent GAC (potentially hazardous), and spent adsorptive resin (under air stripping option; potentially hazardous). In general, a large quantity of residuals requiring offsite transport and disposal will be generated for a very low wastewater flow.

The estimated capital cost for the conceptual treatment train is on the order of $350,000, and O&M costs are estimated to be around $100,000 per year.

The groundwater meets POTW discharge limits before treatment, so the main effect of treatment would be to needlessly remove low level organic constituents, some metals, and reduce the hardness. The low flowrate and unnecessary chemical removals for POTW discharge do not seem to justify the high treatment costs for a groundwater treatment option.

Comment 5: **The Department considers the 10^{-6} cancer risk as the point of departure at which risk management decisions will be considered at the site (see Department's comments dated 9/24/92, 11/30/92). Risk levels in excess of 10^{-6} are indicative of sites which may be candidates for risk management actions to lower the site-specific risk.**

Response: The Navy's position regarding this issue is documented in the responses to agency comments on the Draft OU IV ASR. Information necessary to evaluate chemicals contributing to cancer risk at 10^{-6} levels is presented in the OU II PHEE for both residential and commercial scenarios. A preliminary review of the PHEE results indicates that the following chemicals would contribute to cancer risk at the 10^{-6} level in addition to those identified in the PHEE as contributing to risk at a cancer risk level of 10^{-4}: arsenic, beryllium, and nickel in soil at all sites. Aldrin may also be a concern at Site IR-6. Comparison of observed concentrations of these chemicals to interim ambient levels, as summarized in the OU II RI report, indicates that occurrences are likely associated with nonpoint sources, and thus were not considered in defining TRGs and remedial units. Occurrences of all chemicals at OU II Sites will be reevaluated as part of parcel RI/FS studies.

Comment 6: **As these documents are considered stand-alone they should include the following at a minimum: 1) data necessary to conclude that interim action is recommended, 2) Target Remedial Goal (TRG) calculations from the OU II FS.**

Response: 1) Unlike other Draft HPA ASRs, the ASR for OU II is a summary document and references the previously completed OU II RI, PHEE, and FS reports as backup to the ASR content. 2) TRG calculations other than for the commercial exposure scenario were provided in the OU II FS; TRG calculations for the commercial scenario have been added to this report as Appendix A.

Comment 7: **The Department cannot accept the TRGs for petroleum fuels and oil and grease without a risk analysis and supporting documentation. The Navy did not calculate risk for diesel in the Public Health and Environmental Evaluation (PHEE) because it was not selected as a chemical of concern.**

Response: Risk associated with petroleum fuels and oil and grease was not evaluated in the OU II PHEE Report because the chemicals of concern identified and quantified in the report were considered representative of any potential exposures to the components comprising the petroleum fuels and oil and grease detected at OU II sites. Based on the results of the OU II PHEE Report, TRGs were identified for the components identified as presenting a possible future human health risk. The TRGs presented in the FS have been used at similar sites and are conservative for the OU II sites and the expected land uses. (See Response to RWQCB Specific Comment 5 for specific examples and additional discussion.)

B. Specific Comments

Comment 1: **Page 3; Include an analysis of groundwater treatment alternatives. See general comment #4 above.**

Response: See Response to General Comment 4 above.

Comment 2: **Page 6, Section 1.3.2; Clarify that the PHEE will be included in the RI, not replaced by the RI.**

Response: The word "replace" was changed to "be".

Comment 3: **Page 8, Section 2.0; Clarify throughout the document that only human health risks are assessed in this report and ecological/environmental risks will be assessed in the overall site-wide or parcel RI/FS. See general comment #2.**

Response: Section 2.0 and other parts of the text have been revised to address this comment.

Comment 4: **Page 9; When point sources are discussed, include discussion and definition of non-point sources.**

Response: Definitions of point and nonpoint sources are presented in Section 2.2.

Comment 5: **Page 19, Section 4.0; Clarify that "environmental impacts of the chemicals on ecological receptors are being investigated on a facility-wide basis" because data is not available yet.**

Response: The text has been revised to address this comment.

Comment 6: Page 19, Section 4.1; Clarify that the air sampling is not complete.

Response: As indicated in Section 1.3.1, air sampling, which is a facility-wide investigation, is being performed in stages; the first phase stage is complete, and the approved work plan for a second phase is awaiting implementation. Available air sampling data pertaining to OU II sites were used to support the conclusions made in the report.

Comment 7: Page 21, Section 4.3; Although the Navy may not want to consider the groundwater unit at IR 8 for interim action due to high total dissolved solid levels, it should be stated in the report that groundwater will be monitored on a continued basis and the human health and environmental risk will be fully assessed in the site or parcel-wide PHEE.

Response: The text has been revised to state that groundwater at Site IR-8 will be monitored as part of the Facility Groundwater Monitoring Program. Section 2.0 of the report notes that results of completed ongoing and proposed investigations will be used in the parcel RI/FS to evaluate the need for final remedial actions.

Comment 8: Page 22, Section 4.4; The Department considers the 10^{-6} cancer risk as the point of departure at which risk management decisions will be considered at the site. See general comment #6.

Response: The text has been revised to address this comment. The text was revised to clarify the reasons for summarizing the results based on a target cancer risk of 10^{-4}.

Comment 9: Page 25, Section 4.4.7; Clarify the basis for focusing on point-sources. If the primary discussion of this will be earlier in the report, this section should be cited in Section 4.4.7.

Response: The rationale for focusing on point sources is presented in Section 2.2. A reference to Section 2.2 has been added to Section 5.4.7.

Comment 10: Page 25; Change the following sentence "Because the most likely future scenario..." to "A possible future scenario is commercial, thus TRGs in soil...".

Response: The text has been revised to address this comment.

Comment 11: **Page 26; Include rationale and background calculations for the Target Remedial Goals. It may be appropriate to include excerpts from Appendix A in the OU II FS. In addition, the Department cannot accept the TRGs for petroleum fuels and oil and grease without supporting documentation and risk analysis. In petroleum cleanups in California, as well as other states, the diesel cleanup levels are much lower than 500 or 1000 ppm, depending on site conditions.**

Response: Please refer to the Response to DTSC General Comment 6 above regarding TRG backup calculations and DTSC General Comment 7 and RWQCB Specific Comment 5 regarding petroleum fuels (e.g., diesel) and oil and grease. A risk analysis was performed on the carcinogenic and noncarcinogenic components of the diesel and oil and grease at Site IR-6, and TRGs were developed for cPAHs and nPAHs. Benzene at 1.0 ppm is commonly used as a criterion for soil cleanup by the Regional Water Quality Control Board (RWQCB) for protection of groundwater. Benzene was not detected above 0.14 ppm in soil; therefore, cleanup levels at sites containing petroleum products were reviewed, and TRGs were developed on the basis of similar site conditions.

Comment 12: **Page 28; Explain the rationale for selecting "target chemicals" from "chemicals of concern".**

Response: This comment addresses text on page 26. Target chemicals refer to the subset of chemicals of concern that may present a potential health risk based on the results of the OU II PHEE Report and for which TRGs needed to be developed. The text on pages 25 and 26 has been revised to define target chemicals at the beginning of Section 5.4.7; the acronym COCs has been changed to target chemicals in subsequent pages, where appropriate.

Comment 13: **Page 28, Section 5.1; Criteria discussed in this section is acceptable except for the "Potential long-term threat to environmental receptors exists". It should be added that the risk to environmental receptors has not been assessed.**

Response: This comment is acknowledged. Section 2.0 has been expanded to note that risks to environmental receptors are not addressed in the ASR.

Comment 14: **Page 29, Section 5.1; Clarify how an interim action would "hinder future implementation of long-term action."**

Response: Because future parcel RI/FS studies will examine options for long-term or final actions taken at the sites, certain interim actions, if implemented, could affect long-term actions. The type and extent of any required final action is uncertain at this time and will be affected by a number of factors. For example, ultimate land use could affect the choice of remedial actions; capping may be appropriate for certain commercial, industrial, or recreational uses, but may not be appropriate for residential uses. Interim actions consisting of excavation and treatment or disposal would be consistent with similar types of final actions but may not be consistent with or necessary in conjunction with others such as capping.

Comment 15: **Page 29; It is inappropriate to assume a future land use at this stage. Therefore, delete "future users of the site would not be expected...".**

Response: The text has been revised to clarify the issue regarding future users of Site IR-8.

Comment 16: **Page 29; The IR 9 removal currently planned should be discussed. Also, in the IR 9 and IR 10 discussions, mention that groundwater monitoring will continue and human health and environmental risks will be reevaluated in the base or parcel-wide RI/FS. Delete "the groundwater at this site is not currently used as a water supply, and it is doubtful whether it would...".**

Response: A discussion of the removal action currently planned for Site IR-9 has been added to Section 6.1. The statement that Sites IR-9 and IR-10 are included in the Facility Groundwater Monitoring Program also has been added to Section 6.1.

The Navy does not agree with the removal of the statement that the future use of groundwater at Sites IR-9 and IR-10 is doubtful. On the basis of the shallow groundwater table, the low pumping rates sustained at these sites during aquifer testing, and the elevated TDS levels (up to 9,940 mg/l at Site IR-9 and 6,640 mg/l at Site IR-10), the Navy believes that use of shallow groundwater at these sites is doubtful. In addition, Hunters Point Annex is already connected to the City of San Francisco water system, which provides a high quality water source to these sites.

Comment 17: **Page 30; As discussed in The Department's OU II Feasibility Study comments (dated 11/30/92), if a groundwater unit is proposed for treatment all groundwater contamination within that zone and the nearby area must be considered whether or not it is from point sources. Consideration of all contaminants may impact whether SF's POTW standards are met, and affect the design of a treatment system. Also, as stated in the Department's OU II Remedial Investigation comments (dated 7/10/92), the extent of contamination in IR 6 has not been completely defined. Thus, the Navy cannot select one well as defining the extent of groundwater contamination. In addition, please include a**

schedule for concluding the groundwater investigation in this area, which is necessary to fully evaluate alternatives.

Response: The analysis for the IR-6 groundwater unit considers all chemicals measured in water samples from the site, including chemicals from both point and nonpoint sources. All maximum chemical concentrations from both point and nonpoint sources are below POTW acceptance limits. (See Response to Comment 4.) The Navy believes that there are sufficient data to begin remediation of the groundwater at Site IR-6 because groundwater contamination in the uppermost aquifer at Site IR-6 has been defined downgradient of the site for all organic compounds. In addition, the A-aquifer pinches out against the bedrock just south of Monitoring Well IR06MW22A and just west of Monitoring Well IR06MW42A. Maps showing the distribution of organic compounds in groundwater at Site IR-6 and a saturated thickness map for the A-aquifer are presented in the OU II RI Report.

The smaller plume surrounding Monitoring Well IR06MW42A is defined to the south by IR06MW27A and IR06MW23A, to the north by IR06MW45A and the east by IR06MW41A. The uppermost aquifer pinches out just to the west of IR06MW42A.

The groundwater in the bedrock at Site IR-6 may be investigated further as part of a parcel RI/FS, as necessary. Investigation of this area would be addressed as part of parcel RI activities in parallel with PA sites in Parcel B recommended for remedial investigations.

Comment 18: **Page 30; Add the following underlined phrase to the sentence "The interim action soil remedial unit at site IR 6 is the area of soil contamination related to point-source releases with concentrations above TRGs for commercial use" <u>because commercial use is the current scenario at site</u>.**

Response: This addition has been made to the text.

Comment 19: **Page 30; The fact that groundwater in IR 6 is thought to be in communication with the Bay is an important criteria for interim action at IR 6. Since the threat to the Bay has been shown by aquifer testing, a pump and treat system should be implemented to prevent further migration into the Bay.**

Response: Migration of groundwater to the Bay and ecological risks associated with the migration of groundwater to the Bay were not used as criteria in evaluating whether an interim action should be performed; the threat to the Bay will be considered as part of a parcel RI/FS. In addition, communication of groundwater at Site IR-6 with the Bay has not been established. Groundwater flow directions indicate that groundwater from

Site IR-6 flows toward a groundwater trough at Lockwood Street and does not flow on toward the Bay; this interpretation is also supported by the definition of the groundwater plume to nondetectable levels on the north side of Lockwood Street.

Comment 20: Page 32; The definition and impact of Health Index values should be explained in this document.

Response: The term hazard index (HI) has been defined and its impact explained in Section 5.4.

Comment 21: Page 32; Explain the use of "long term interim" in the table.

Response: The implementation of certain interim actions could be consistent with long-term objectives. As noted in Section 2.2, the Navy intends to make interim actions consistent with future actions and land uses to the extent possible. Therefore, the "Interim Action Objectives" table includes long-term objectives and potential remediation requirements. In addition, long term objectives such as preventing further leaching of chemicals to the groundwater were considered during the interim action evaluation process.

Comment 22: Page 34; Groundwater treatment alternatives should be included. See General Comment #4.

Response: See Response to General Comment 4. The text has been expanded to discuss groundwater treatment further. Groundwater treatment was fully evaluated and found to be infeasible because of the brackish nature of the groundwater which would require extensive softening and filtration pretreatments prior to treatment of point-source chemicals.

In addition, it is unlikely that shallow aquifer water will be used as a potential drinking water source; therefore, treatment was eliminated from further consideration as an interim action. The parcel RI/FS will reassess the long-term aspects of groundwater remediation; for purposes of interim action at OU II sites, hydraulic control of the groundwater can be accomplished in the short-term by collection and discharge to the POTW.

Comment 23: Page 36, Section 5.5.1; Clarify the following sentence: "Its implementation would presumably discontinue any current remedial measures".

Response: The text has been revised to reflect that the implementation of the no action/institutional action alternative would presume no further remedial action at the site after implementation of the Tank Farm removal action.

Comment 24: Page 38; The Navy's change from a permanent to a temporary cap should be reflected in the discussion for IR 6. For example, the following sentence should be revised: "Some areas are bare and would constitute ... installation of a cap...".

Response: This sentence has been revised.

Comment 25: Page 40; See general comment #4 regarding groundwater treatment alternatives.

Response: See Response to Specific Comment 22 above.

Comment 26: Page 42; Table 5 should be cited in this discussion of IR 6 treatment alternatives.

Response: A summary of each alternative is referred to in Section 6.5.4, Comparison of Interim Action Alternatives, and is referenced for the description of each alternative.

Comment 27: Page 46, Second paragraph; Add a summary of community relations efforts.

Response: A discussion of community relations is given in Section 1.4.

Comment 28: Page 48, 1st paragraph, second sentence; Please spell out interim action throughout the report.

Response: IA has been spelled out throughout the report.

Comment 29: Page 48; Clarify which exposure scenarios and contaminants "pose human health risks".

Response: This section (Section 7.0) has been revised for further clarification.

Comment 30: Page 48; In the conclusion, restate criteria for interim action as discussed on page 28.

Response: These criteria are restated in Section 7.0.

Comment 31: Plate 2-5; It is necessary to provide supporting documentation along with these plates. The following information should be provided at a minimum: 1) contaminant/s used to define the plumes or areas of

contamination, 2) contaminant levels which define the edges of the plume or soil unit, 3) question marks or some other form of demarkation if the extent of contamination is not known. For example, as shown in the OU II RI, the extent of groundwater contamination surrounding Monitoring Well IR10MW12A in IR 10 has not been defined.

Response: Plates 2 through 5 have been revised to indicate the chemicals that were used to define the contaminated areas. Additional information on the distribution of individual point-source chemicals at the OU II sites is presented in the OU II RI Report.

Comment 32: Appendix B, Alternative 1; Explain the cost added for the deed restriction. Legal fees are not a capital expenditure.

Response: Costs associated with deed restrictions were considered as indirect capital costs because of the need for administrative and Navy involvement in their implementation.

Comment 33: Appendix C; Explain basis for revision of this table.

Response: This table was revised because the total health-based level (tHBL) for noncarcinogenic PAHs was revised from 54.2 μg/l to 542 μg/l by the EPA in March 1992. (See Section 5.4.7.)

C. DTSC Human and Ecological Risk Section Comments

General Comments

Comment: As this ASR is a summary of previously issued reports on OU II, the comments previously made by HERS, especially those comments made on the PHEE, are particularly relevant to review of this report. The risk assessment method which utilized total health-based levels (tHBLs) for those compounds lacking regulatory levels is particularly limited. These total health-based levels are essentially the preliminary remediation goals (PRGs) in Volume I, Part B of Risk Assessment Guidance for Superfund Sites (RAGS) (*EPA, 1991*). Chemicals for which the average or maximum concentration detected is not greater than certain ARARs or the appropriate $tHBL_c$ or $tHBL_n$ are not carried forward as COCs in the risk assessment (PHEE Tables 7-8 through 7-17). The flaw in this method is that it does not consider additivity or multimedia exposures. The $tHBL_c$ values are based on a risk of 10^{-6}. A chemical could contribute a risk of 9.99×10^{-7} and not be carried forward in the risk assessment. Similarly, the $tHBL_n$ is based on a hazard quotient of 1.0. A chemical concentration compared to the appropriate reference dose could have a hazard quotient of 0.99 and not be carried forward in the risk assessment. Numerous chemicals which had detection frequencies of

20 or 50 percent were not carried forward in the PHEE risk assessment which I checked: surface soils for IR-8 and groundwater for the combined IR-6/IR-10. This selection process for chemicals of concern could seriously underestimate the risk posed by contaminants at HPA.

Response: Please refer to the *Navy Responses to Supplemental Agency Comments on the OU II PHEE Report*, submitted on April 23, 1993, which addresses the use of tHBLs as a screening tool in identifying a representative list of COCs for risk characterization at OU II sites. As shown in the submittal, the OU II PHEE results would not materially change as a result of the inclusion of additional chemicals in the risk analyses.

Comment: The population partitioning method of determining background, which was outlined in a technical memorandum titled *Background Soil and Groundwater Conditions, Naval Station, Treasure Island, Hunters Point Annex, San Francisco, California*, dated March 19, 1992 has not been accepted by regulatory agencies, yet is used in the PHEE report. This method of evaluating "background" levels of contamination should not be used until approved (See interim ambient level footnote, Table 1).

Response: This comment is acknowledged; however, please note that background levels were not used to exclude chemicals from the list of COCs from risk characterization in the OU II PHEE Report. The background levels were used only to interpret the risk results; risk estimate totals reflect contributions from all COCs, not just those associated with point sources.

The background levels also were used to evaluate nonpoint and point-source related chemicals at OU II sites as part of evaluation of interim actions. Final actions which will be considered during the parcel RI/FS studies will consider chemicals from both point and nonpoint sources.

<u>Specific Comments</u>

Comment: The third criteria for selection of interim alternative actions (Section 2.0, page 10) should include consideration of the protection of the ecological community in addition to protection of human health. Interim remedial actions which are protective of human health may actually produce a negative impact on the surrounding ecological community. Consideration of the impact of "current site conditions" on environmental receptors and the "potential long-term threat" to environmental receptors in defining the interim action remedial units (Section 5.1, page 28) is encouraging, however, target remedial goals (TRGs) where not developed to be protective of environmental receptors (Section 4.4.7, page 27).

Response: Consideration of ecological receptors is outside the scope of interim action studies, as noted in the revised Section 2.0. The comment is accurate in noting that TRGs were developed to be protective of human health, and not environmental receptors. This approach was taken because risks to ecological receptors have not been evaluated at this time. Ecological receptors will be addressed in parcel RI/FS studies.

Comment: **How can the concentration of hexavalent chromium be greater than the total chromium concentration (Section 3.2.2.3, page 15)?**

Response: Water samples for total chromium were filtered and analyzed by CLP methods for dissolved chromium. The samples for hexavalent chromium were not filtered and were analyzed by EPA Method 7196. The concentrations of hexavalent chromium may be in excess of the concentrations of total chromium because the total chromium results only represent the dissolved phase. In addition, the analyses were performed by different laboratories; this could also lead to some variation in the results.

Comment: **The Office of Scientific Affairs (OSA), Human and Ecological Risk Section (HERS) considers a risk level of 10^{-6} as the point of departure (Section 4.4, page 22). Use of the 10^{-4} risk level as the criterion for presenting exposure scenarios may under represent the number and types of scenarios resulting in significant risk. A similar comment was made in review of the PHEE (Section 4.2.1, page A-8).**

Response: The comment is acknowledged. Presentation of risk assessment results in the OU II PHEE (Tables 8-2 through 8-5 and Appendix F) do not assume a particular risk level and, therefore, are useful for decision makers regardless of the risk level under consideration. Please also refer to the Navy Supplemental Responses to Agency Comments on the OU II PHEE Report submitted on April 23, 1993, and the response to DTSC General Comment No. 5.

Comment: **The U.S. EPA criterion for potable water is incorrectly referred to as 10,000 micrograms per liter total dissolved solids (TDS) rather than 10,000 milligrams per liter (Section 4.4.7, page 26).**

Response: The text has been revised to say micrograms instead of milligrams.

Conclusions

Comment: **The appropriate use of this Alternative Selection Report (ASR) and those being prepared for other operable units at Hunters Point is critical. As long as access to these four OU II sites remains restricted by institutional controls and use of the four sites remains the same as current use until the final remedial alternative is selected, the conclusions of the ASR regarding the imminent threat to human health**

are supportable. However, no conclusion should be inferred regarding the potential impact to ecological receptors. The results of this ASR should not be interpreted to mean that remedial action at operable unit 2 sites is not necessary.

An evaluation of the potential risk to non-human receptors should be included in this and future ASRs for Hunters Point considering the location and apparent free exchange of groundwater and San Francisco Bay water.

Response: This comment is acknowledged. Regarding consideration of ecological receptors, please see response to the first Specific Comment from HERS.

II RWQCB COMMENTS AND NAVY RESPONSES

A. General Comments

Comment 1: **It needs to be clearly demonstrated that the concentrations of contaminants in groundwater to be disposed to the POTW do not exceed the pretreatment limits for the POTW. Please provide a table showing the pretreatment limits of the POTW and the ranges of concentrations of contaminated groundwater to be disposed.**

Response: Table 5 shows the chemicals of concern in groundwater at Site IR-6, their maximum concentrations, and the corresponding acceptance limits at the POTW. All chemicals, including those from nonpoint sources, are below POTW regulated acceptance limits.

Comment 2: **What was the basis for the determination of "interim ambient levels" of contaminants in groundwater referred to in the plates?**

Response: The interim ambient levels referred to on Plates 2 though 4 were presented in the *Technical Memorandum, Background Soil and Groundwater Conditions* (*HLA, 1992d*). The areas shown on the plates also include detectable levels of organic chemicals which are related to point sources. The plates have been revised to indicate which chemicals were used in defining the areas of groundwater contamination.

Comment 3: **There is a difference between the cleanup level for the groundwater that is to be discharged and the cleanup level for the aquifer. The cleanup levels for groundwater to be discharged to waters of the State (e.g., surface water or reinjection outside the contaminant plume) must be treated by the Best Available Technology (BAT) and must be consistent with Resolution 68-16. For VOCs the value is non-detect or 0.5 ppb. Local pretreatment standards must be met if the groundwater will be discharged to a POTW. While interim remedial action may have a cleanup goal of federal MCLs, final aquifer cleanup is to "background" concentrations, which, for anthropogenic organic compounds, is zero. Any alternative aquifer cleanup levels less stringent than background shall be established in conformance with State Board Resolution 68-16.**

Response: The Navy acknowledges that discharge standards and aquifer cleanup standards may be, and normally are, different. Treatment by the BAT under *Beneficial Uses, San Francisco Bay Basin Region 2, Water Quality Control Plan, 1986 and 1992*, refers to surface water discharge or reinjection, neither of which is proposed for Site IR-6 groundwater. Maximum concentrations of point and nonpoint source chemicals are below POTW acceptance limits.

With regard to TRGs, the interim action TRGs proposed in the Draft OU II ASR are identical to TRGs proposed in the OU II FS (*HLA, 1992k*), with the exception of TRGs for PAHs where values were revised based on recent EPA guidance (*EPA, 1992b,c*). The TRGs proposed in the OU II FS were used in the ASR because no comments were received from the agencies on these proposed goals. In any case, final aquifer cleanup standards would be recommended as part of parcel RI/FS studies.

Comment 4: **The proposed TPH diesel and oil and grease soil cleanup levels of 500 and 1000 mg/kg are not consistent with current soil cleanup standards for underground tanks (Tri-Regional Board Staff Recommendations for Preliminary Evaluation and Investigation of Underground Tank Sites, August 10, 1990, as updated). If the capital costs of building a soil biotreatment facility is estimated to be $1.9 million, what is the incremental cost of treating the soil to non-detectable concentrations? Rather than putting soil contaminated with petroleum back into the hole and having to address future water quality issues with respect to environmental receptors, why not clean it up so that the soil can be considered "clean" fill?**

Response: It is the Navy's position that the proposed target remedial goals for total petroleum hydrocarbons as diesel and oil and grease of 1,000 mg/kg are appropriate for this site for the following reasons:

- Groundwater at the site does not meet beneficial use criteria established in the San Francisco Bay Water Quality Control Plan (Basin Plan).
- The proposed cleanup level is consistent with cleanup levels for petroleum hydrocarbons at other sites.
- Residual petroleum hydrocarbons at concentrations up to 1,000 mg/kg in soil would be protective of groundwater and would pose a minimal threat to groundwater quality.
- Proposed groundwater removal actions and facility groundwater monitoring would adequately address existing and potential contamination.

Each of these reasons is discussed further below:

- <u>Beneficial Uses</u>. The Basin Plan identifies the following present or potential beneficial uses of groundwater:
  - o Municipal or domestic water supply
  - o Industrial water supply

- o Agricultural water supply
- o Fresh water replenishment to surface water.

Municipal or Domestic Use

Groundwater at HPA is not being used as a municipal or domestic water supply. To assess potential suitability of groundwater for municipal or domestic water supply, the RWQCB uses a criterion of 3,000 mg/l total dissolved solids (TDS) (State Water Resources Control Board Resolution 88-63). At Site IR-6, the extent of groundwater meeting this criterion and showing evidence of chemicals associated with point sources is limited. Based on measured TDS levels at monitoring wells at Site IR-6, 8 of the 16 wells show TDS levels that were less than the 3,000 mg/l criterion. Of these wells that meet the criterion, 4 show chemicals associated with point sources at concentrations exceeding state or federal MCLs. Resolution 88-63 "exempts waters showing contamination . . . unrelated to a specific pollution incident that cannot reasonably be treated for domestic use using either Best Management Practices or best economically achievable treatment practices." The presence of elevated concentrations of dissolved solids in groundwater at Site IR-6 is apparently associated with nonpoint sources and is not related to a specific pollution incident. As described in the response to DTSC Specific Comment 22, treating this water using best available technology would be very costly and does not appear economical. Furthermore, such treatment would produce numerous liquid and solid waste streams related to pretreatment steps and unrelated to removal of the organic chemicals of interest. For these reasons, groundwater at HPA does not appear to meet the RWQCB criteria for a potential water supply. In addition, HPA is already connected to the City of San Francisco water supply system, which provides a high quality water source at an economical cost to the facility.

Industrial or Agricultural Supply

Groundwater at HPA also is not used for industrial or agricultural supply. Because of treatment requirements and costs addressed above relative to its potential as a potable supply, groundwater at HPA also is not considered as potential industrial or agricultural supply.

Freshwater Replenishment to Surface Water

Regarding the fourth beneficial use of groundwater, the potential for replenishment to surface water (San Francisco Bay) does exist at HPA. However, migration of organic contaminants has been limited to a maximum of about 200 feet from suspected sources which may have existed for as long as 50 years. Organics in groundwater show characteristic patterns of point-source contamination, with the highest concentrations found close to the source and decreasing concentrations farther away from the source. The lowest levels of organic contamination detected in the groundwater are still more than 600 feet from the Bay; thus it does not appear that the contamination has affected the Bay, nor does it pose an imminent threat to the Bay. The potential future threat to the Bay also appears very limited: the primary source (the tanks) was recently removed, and the existing soil contamination, although in place for up to 50 years, has resulted in a plume of limited areal extent.

- Consistency with Soil Cleanup Levels for Petroleum Hydrocarbons. The RWQCB has in some cases used soil concentrations of individual chemicals of particular concern as a basis for estimating cleanup levels for soils contaminated with petroleum hydrocarbons. For example, in an RWQCB-directed cleanup at Chevron Hilltop, Richmond, a benzene concentration of 1 mg/kg was used as the basis for establishing cleanup levels for soil contaminated primarily with crude oil. If a similar standard were applied to soils at IR-6, no soil would require cleanup, given the maximum measured benzene concentration of 0.14 mg/kg. (See also Response to Specific Comment #5).

- Cleanup Levels Protective of Groundwater. According to the Basin Plan, residual pollutants may be allowed to remain in the soil if they would not cause concentrations to exceed groundwater cleanup levels. The proposed interim action would further reduce leaching and migration potential by removing soil with TPH levels above 1,000 mg/kg, and also address the presence of organics in groundwater and their potential for migration through a hydraulic control trench system. While specific cleanup levels for TPH diesel or cPAHs in groundwater have not been established, residual TPH diesel concentrations up to 1,000 mg/kg in soil are expected to have a minimal effect on groundwater quality, based on existing concentrations of petroleum hydrocarbons in soil and groundwater at the site, as discussed below.

  Maximum TPH diesel levels of 26,000 mg/kg in soil and 4.9 mg/l in groundwater can be used to estimate a distribution coefficient, k_d, for this mixture. This value can then be applied to the proposed cleanup level to estimate a revised equilibrium concentration of diesel constituents in groundwater, assuming no action were taken to control or treat groundwater. Dividing the maximum soil concentration by the maximum water concentration results in an estimated k_d of 5,000 ml/g. Applying this value to the proposed 1,000 mg/kg diesel cleanup level, an estimated equilibrium concentration of 0.2 mg/l TPH diesel is estimated.

Even assuming that all of this were naphthalene (the only PAH detected in groundwater at Site IR-6 for which a cleanup level is proposed in this ASR), the concentration would be below the naphthalene cleanup level of 542 $\mu g/l$; the naphthalene cleanup level is estimated to be protective for use of this water as a drinking water supply, the highest conceivable beneficial use of the water.

Monitoring wells at Site IR-6 and at adjacent sites (Site IR-10) are included in the Facility Groundwater Monitoring Program proposed for HPA as described in Appendix A of the *Facility Groundwater Monitoring Plan* (*HLA, 1992i*). Groundwater monitoring will allow for detection of any potential migration or leaching of contaminants which remain in the soil in the future; the Facility Groundwater Monitoring Program would continue after completion of soil and groundwater removal as part of the interim action.

The incremental cost associated with treating the soil to nondetectable concentrations will be approximately $5 to $15 per cubic yard. As referenced in Section 6.5.2.1, this method has achieved nondetectable concentrations at other sites. However, treatment to nondetectable levels depends on the type of contaminant (e.g., whether heavy or light hydrocarbons), the initial soil concentrations, and the type of soil. The treatability study will assess what levels are achievable through this method.

See also Response to DTSC Specific Comment 11 and RWQCB Specific Comment 5 regarding TRGs for petroleum hydrocarbons.

B. Specific Comments

Comment 1: **p. 9, Section 2.0; The text states that an "interim remedial action is appropriate when: contamination related to a point source poses an imminent threat to human health and the environment", yet no ecological risk data are considered in this Alternative Section Report (ASR). If human health criteria are going to drive the interim action, then when human health criteria are lacking, as is the case with oil and grease and TPH diesel (TPHd), environmental criteria or other regulatory requirements should determine the cleanup level. The Tri-Valley guidelines for cleanup of petroleum wastes state that non-detectable concentrations (10 ppm) are the appropriate soil cleanup level to protect the beneficial use of groundwater.**

Response: The text of Section 2.0 has been revised to state that environmental receptors are considered in the ASR. The use of criteria other than those based on human health risk assessments to set TRGs was taken into consideration in the OU II FS and the ASR. Please see the response to RWQCB Specific Comment 5 for a more detailed response to this comment.

Comment 2: **p. 21, Section 4.2; While the reasonable maximum exposure (RME) scenarios provide a conservative estimate of risk when all pathways are considered. Given the limited number of complete pathways included in this analysis, it may overstate the case to say that the "RME scenario provides a conservatively high (upperbound) estimate" of risk.**

Response: The number of complete pathways included in the PHEE for the OU II sites ranged from six in the case of Site IR-8 to nine in the case of Site IR-9, IR-6, and IR-10.

With respect to the comment that a limited number of pathways were considered, this subset of all possible pathways considered in the OU II PHEE was presented to and conceptually agreed to by the agencies. Specific comments on pathways considered and quantification of risks from chemicals associated with these pathways have been addressed in response to agency comments on the OU II PHEE. The OU II ASR summarizes the results of the OU II PHEE, and the apparent consensus on the adequacy of representation of the RME scenarios reflected in the OU II PHEE. In addition, based on both the intake assumptions used in quantifying RME scenarios and summing the six to nine RME pathways, the RME scenario, as defined for these sites, can reasonably be expected to provide a conservatively high estimate, especially for hypothetical future exposure scenarios.

Comment 3: **p. 21, Section 4.3; A sentence should be added to the paragraph which states that "Groundwater COCs and cleanup levels for Site IR-8 will be based on environmental health criteria and ARARs and addressed in the Parcel-based ROD."**

Response: The text was revised to state that environmental criteria or ARARs specific to the groundwater of Site IR-8 are expected to be evaluated in future parcel RI/FS studies.

Comment 4: **p. 22, Section 4.4; It was my understanding that the risk scenarios would address excess cancer risks of one-in-one million.**

Response: Additional text has been added to Section 5.4 to explain the reasons for evaluating human health risks at OU II sites based on 1×10^{-4} (instead of 1×10^{-6}).

Comment 5: **pp. 26 and 27, Section 4.4.7; Please cite the source(s) for the proposed cleanup levels for the residential use and commercial use scenarios. Where did the TPH diesel and oil and grease soil cleanup values of 500 ppm for residential use and the 1,000 ppm for commercial use come from? What are the "comparable" concentrations and which regulatory agencies "approved" them?**

Response: The following references are given as examples:

- Harding Lawson Associates, September 15, 1992. *Revised Draft Remedial Action Plan, Marina Bay Development, Richmond, California.*

  The cleanup level for total petroleum hydrocarbons (TPH)/total oil and grease (TOG) was 500 mg/kg, approved by the DTSC on September 15, 1992 (presently under public review).

- Harding Lawson Associates, February 28, 1992. *Soil Remediation Activities, Tanks 53, 54, 56, and 57d, Site K (Seawall Lot 333), San Francisco, California.*

  The cleanup level for TPH was 1,000 mg/kg, approved by the RWQCB on April 15, 1992.

- Harding Lawson Associates, November 9, 1992. *Construction Certification Report, Area 312 Soil Removal, Hilltop West Area, Richmond, California.*

  The cleanup level for TPH/TOG was based on a benzene cleanup level of 1 mg/kg, approved by RWQCB on November 9, 1992.

- Harding Lawson Associates, July 23, 1990. *Remedial Plan, Hydrocarbon Area, Franciscan Ceramics Site, Los Angeles, California.*

  The cleanup level for TPH was 1,000 mg/kg, approved by the DTSC and the RWQCB in August 1990.

Comment 6: **p. 26, Section 4.4.7; A statement should be added to the effect that remediation of contaminated non-potable groundwater will be addressed in the Parcel-wide ROD.**

Response: The fourth bullet in Section 5.4.7 has been revised to respond to this comment.

Comment 7: **p. 38, Section 5.5.2; Use of some of the contaminated groundwater pumped from the two small aquifers should be considered for on-site use in the bioremediation of soils. Regional Board Resolution 88-160 holds that groundwater extracted as a result of cleanup activities should be reclaimed or reused to the maximum extent technically and economically feasible.**

Response: This comment is noted. The treatability study will determine whether the groundwater could be used during biotreatment without inhibiting microbial growth because of its salinity and TDS content. It is expected that up to 50 percent of the irrigation water could be groundwater which would be mixed with municipal or stormwater before application to the biotreatment pad.

Comment 8: **p. 40, Section 5.5.2; Please modify the last sentence to read: ". . . discharge to the POTW would be accomplished through piping the water to the nearest sanitary sewer."**

Response: The text has been revised.

III EPA COMMENTS AND NAVY RESPONSES

A. Specific Comments

Comment 1: **The ASR must include the identification of ARARs and an analysis of the alternatives' compliance with ARARs.**

Response: ARARs were identified and analyzed as they pertained to each interim action alternative studied during the ASR for IR-6. A summary of those discussions has been added to Section 4.0.

Comment 2: **As noted in comments on the OU IV ASR, this document does not assess whether current site conditions pose an immediate or long-term threat to existing environmental receptors. Sections 2.0, 5.1, 5.2, and others as necessary, should be revised to state that the ASR does not address environmental risk.**

Response: These sections have been revised.

Comment 3: **The table on page 15 presents data which suggest chromium (VI) is present in groundwater at a concentration in excess of that observed for total chromium. If this is an error, it should be corrected. If this is not an error, provide an explanation for these results.**

Response: The table presented on page 15 is correct. Water samples for total chromium were filtered and analyzed by CLP Methods for dissolved chromium. The samples for hexavalent chromium were not filtered and were analyzed by EPA Method 7196. The concentrations of hexavalent chromium may be in excess of the concentrations of total chromium because the total chromium results only represent the dissolved phase. In addition, the analyses were performed by different laboratories; this could also lead to some variation in the results.

Comment 4: The report should briefly identify the potential adverse impacts or conditions which could result from implementation of each interim remedial action and describe the mitigation measures which are proposed for each action (e.g., provide an evaluation of short-term effectiveness).

Response: The short-term effectiveness of implementing each alternative was addressed in the OU II FS, and is referenced in Section 6.4.

Comment 5: The IAA cost estimates lack the detail necessary for a clear comparison and evaluation. For example, the cost difference between IAA-2 and IAA-3 is $110,000, a relatively small amount (less than 5 percent). Yet the text states (on page 46) that costs for each alternative vary considerably. Considering the uncertainty in these estimates, these costs are identical. This point is significant because cost are presented with insufficient detail to support the identification of significant cost differences between IAAs. Inspection of Tables B2 and B3 indicate that the only significant capital cost differences are between "mobilization and site preparation" and "treatment and backfill of soil". Unit costs for the treatment should be provided because, if all other factors are equivalent (as noted in the tables), then unit treatment cost is the only true variable cost that distinguishes between IAAs. Excavation and sampling cost should be presented for sampling and analysis, removal and replacement of soil (per cubic yard), and any necessary revegetation.

Response: The cost estimates of IAAs 2 and 3 provide sufficient detail to make a comparison of the alternatives. Backup costs can be provided if necessary. The costs for the two alternatives vary by less than 5 percent, but vary significantly in comparison to the no action/institutional action alternative. The unit costs between the two treatment alternatives do not vary considerably and are therefore not a distinguishing factor. Tables D2 and D3 have been revised to provide unit costs for excavation and sampling, and treatment.

Comment 6: The preliminary design of the soil bioremediation treatment system should include provisions for a protective layer of material (6 inches of sand, minimum) above the liner. Inclusion of a six inch sand layer will reduce the volume available in the treatment system. The use of 18 inch

soil treatment lifts is not standard practice. A lift thickness of between 6 and 12 inches is more typical. The decrease in effective treatment volume will require larger treatment areas to be constructed (increasing cost) or extend the time required for treatment (also increasing costs).

Response: The design of the soil bioremediation treatment system will include a protective layer of 6 inches of sand.

HLA experience indicates that an 18-inch lift is practicable; however, a 12-inch lift will be used. The soil treatment unit (STU) will then measure 250 by 350 feet instead of 200 by 300 feet; this revision has been made in Section 6.5 and in the cost tables. The cost involved with increasing the size of the STU is minimal as reflected in Table D2. No significant increase in treatment time is anticipated for the larger unit, and adequate area is available at HPA for placement and operation of the system.

Comment 7: There is no mention of sampling during the course of soil treatment to ensure that the process is performing as expected. This information should be included. Post treatment sampling is mentioned, but the rate of 1 sample per 50 cubic yards is inadequate. A statistically-based sampling plan should be considered to verify TRGs have been achieved.

Response: Baseline sampling and periodic process monitoring will be conducted. A statistically based sampling plan will be developed to verify that TRGs have been achieved. Experience suggests that such a sampling plan consists of one sample every 50 to 100 cubic yards. The document *Methods for Evaluating the Attainment of Cleanup Standards - Volume 1: Soils and Solid Media*, published by the EPA in February 1989 (*EPA, 1989a*), was considered as it applied to this site. A 95 percent certainty that 95 percent of the soil would be remediated to below cleanup levels would correspond to the sampling frequency suggested.

Comment 8: The text states that IAA-2 would eliminate the potential for human exposure and further contamination of groundwater. This may be an overly optimistic projection considering that the system is costed for 5 years but the text (page 42) states that 11 years are required to meet TRGs for this alternative. Most confusing is the statement that 3 years will be required to meet TRGs for nPAHs. The report should be clear on the length of time required to clean up groundwater.

Response: Superfund Accelerated Cleanup Model (SACM) Guidance suggests 5 years as the maximum time frame for cost estimates; therefore, costs were based on a 5-year period. There are two interim action groundwater remedial unit areas at Site IR-6, as described in Section 6.1 of the text. The larger groundwater area is estimated to require 11 years to achieve cleanup levels, whereas the smaller area beneath Lockwood Street which contains nPAHs is estimated to require 3 years to achieve cleanup levels, as described in Appendix B. Section 6.5 has been revised to clarify groundwater cleanup times; however, it was previously stated that the maximum estimated cleanup time for the site as a whole is 11 years.

Comment 9: **Explain how lead, PCBs, and cPAHs hot spots will be sampled and analyzed to assure they are removed prior to bioremediation. Will samples be collected *in situ* or after the soil has been removed and stockpiled? What will be the determining factor for excluding soil from bioremediation, the presence of trace levels of PCBs and cPAHs, or will a maximum value be set? If the soil is stockpiled, what will prevent cross-contamination from occurring? These are questions that affect whether soil interim action alternatives are implementable. They should be addressed.**

Response: The soil will be excavated, stockpiled, sampled ex situ, and segregated into lots for disposal or treatment. Soil containing chemicals such as PCBs and PAHs with concentrations below TRGs and hydrocarbons above TRGs will be treated and replaced into the excavated area. The soil stockpiled from each hotspot area will be isolated, and equipment used for handling the soil will be decontaminated each time the equipment moves from one stockpile area to another. It is expected that these methods and other practiced engineering controls will minimize cross-contamination.

Comment 10: **The impact of soil excavation below the water table should be more thoroughly addressed. Excavation within the saturated zone could increase mobility of contaminants in groundwater by solubilizing contaminants which would otherwise be adsorbed.**

Response: The extent that any organic chemical is adsorbed onto a soil surface is directly affected by its molecular size and hydrophobicity (preference for migration and accumulation on hydrophobic surfaces rather than in hydrophilic aqueous solvents). The petroleum products present at the site are large molecules (C_{12} - C_{30}) which have a greater propensity to exist in an adsorbed state and therefore would be extremely difficult to desorb. Secondly, the hydrophobicity of the petroleum hydrocarbon causes preferential partitioning as an adsorbed phase. Therefore, the impact of excavation within the saturated zone on increased mobility of contaminants would be minimal. Although, some solubilization of petroleum hydrocarbon could occur, the solubility of these compounds in groundwater is limited. Because the excavation would be dewatered, and the collected water would be controlled during the excavation, any material that may be solubilized during the excavation process would be captured and properly disposed.

Comment 11: **If groundwater extraction rates are expected to be small, it is not clear that pumping will be sufficient to reverse the groundwater gradient and capture contaminated groundwater in volumes large enough to cause a noticeable impact on contaminant concentrations in the aquifer.**

Response: The extraction system will be capable of intercepting groundwater flow from an area much larger than the area of contamination. The low extraction rates indicate that these materials have low hydraulic conductivities and that the rate of pumping necessary to establish and maintain hydraulic control to dewater the excavation will be low. Although the extraction system will have the ability to lower the water table to the bottom of the extraction trench, this is unlikely because the system will intercept and capture an area much larger than the organic plume area. The existing groundwater monitoring system will be used to monitor and adjust the actual capture area.

B. General Comments

Comment 1: **The report is not consistent with criteria in the OU IV ASR, does not conform to the generic outline of ASRs presented to us on September 22, 1992, and uses assumptions that do not appear to be consistent with the Navy's Interim Action Plan Scheduling Assumptions, dated October 2, 1992 and that have not been agreed upon by the regulatory agencies. For example, the use of TRGs for commercial as opposed to residential use has not been agreed upon. The Interim Remedial Action Objectives on page 32 do not appear to be consistent with the criteria used to determine Interim Action Remedial Units, or to the rationale for retaining or eliminating Interim Action Remedial Units on pages 28-31. We wish to discuss the criteria and assumptions used in this report with you.**

Response: The discussion of criteria for considering interim action in Section 2.0 has been expanded. This discussion is generally consistent with the discussion in Section 2.0 of the Draft Final OU IV ASR.

The outline of the OU II Summary ASR varies somewhat from the generic outline for ASRs presented to the agencies. The OU II Summary ASR was intended to summarize the results of the preceding Draft RI, Draft PHEE, and Draft FS reports, and as such its structure was adjusted to meet that objective while still providing the key elements identified in the generic outline. Section 3.0 of the generic outline was omitted from the Summary ASR; this information is included in the Draft RI and PHEE reports incorporated by reference. Sections 3.0, 5.0, and 6.0 of the ASR are substantively equivalent to Sections 4.0, 5.0, and 6.0 of the generic outline; an ARARs section (Section 4.0) has been added to the Draft Final ASR to improve the equivalency.

Regarding the scheduling assumptions, particularly with respect to agency approval of a commercial scenario, information on the commercial scenario was provided in response to DTSC's General Comment No. 1 on the Draft OU II Feasibility Study, which suggested that future feasibility studies should include a wider range of future land use alternatives; because information on risks based on commercial use scenario was presented in the OU II PHEE, a commercial use scenario was addressed in the ASR. In addition, future commercial use for this area is as probable or more probable than residential use and is therefore appropriately considered.

The criteria used to select interim action remedial units in Section 6.1 indicated that: (1) contamination associated with point sources from site-related activities, (2) contamination levels not complying with ARARs such as MCLs, and (3) site conditions posing an immediate or long-term threat to human receptors, be considered for interim action. These criteria are consistent with Remedial Action Objectives (RAOs) listed in the table, such as minimizing or reducing risks associated with direct exposure to workers and future users, and preventing further degradation of groundwater. The other criteria take into consideration that engineering and field observations may necessarily affect the achievement of the RAOs, but do not change or appear inconsistent with these objectives.

Comment 2: **The report does not include sufficient data from the OU II remedial investigation report to support the selection of the alternative proposed. Also, as in the case of the OU IV ASR, no conceptual model is presented.**

Response: This Summary ASR summarized the previous draft reports, with the intention of relying on references to these reports in lieu of extensive incorporation of previously presented data and interpretations, and consistent with the objective of producing focused, streamlined reports for the interim action alternative selection process.

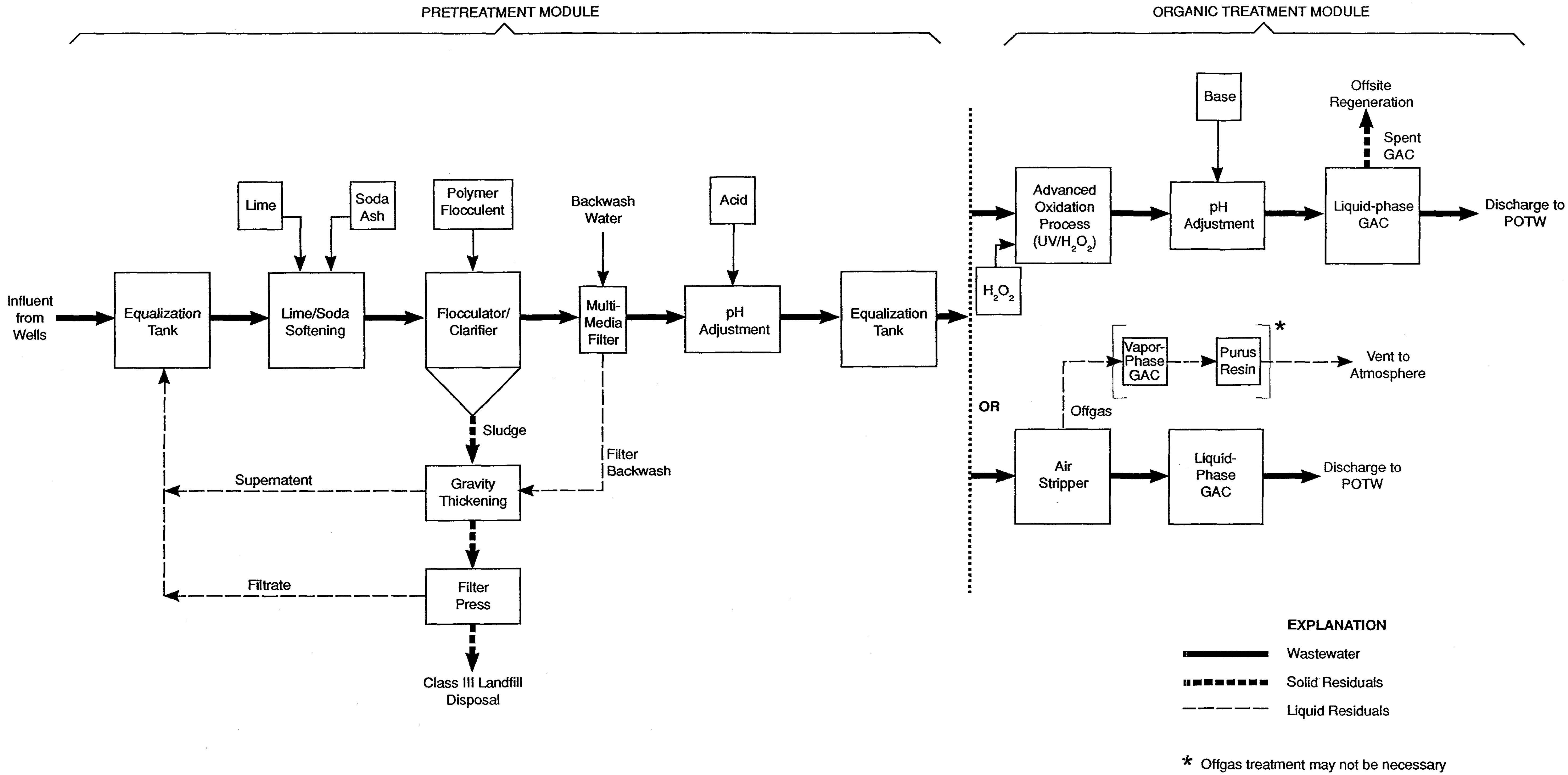
A graphic depiction of a conceptual model of environmental fate and transport pathways was included as Plate J1 of Appendix J of the OU II RI Report.

Comment 3: **The ASR is not responsive to several previous EPA comments on OU II documents, including those pertaining to background levels, chemicals of concern and ARARS. The limitations of interim actions with respect to unresolved issues of background concentrations, ARARS chemicals of concern, and the presence of adjacent investigated sites is not adequately thought out.**

Response: The interim action alternative selection process was proposed specifically to address issues of the kind noted in this comment. As noted by the Navy in numerous previous documents, the selection of final remedial actions for OU II sites was recognized as not being possible in a manner that would meet with regulatory approval because of, for example, ongoing discussions regarding ambient levels and the presence of nearby uninvestigated sites, among other issues. If all policy-type issues were resolved and all investigations were complete, there would not have been a need to develop an alternative approach to the classical RI/FS process. These limitations were recognized and acknowledged as early as April 1992 during discussions with the agencies regarding redefinition of OU V.

Regarding ARARs, a section has been added to the ASR that presents a focused discussion of ARARs relevant to the proposed interim action. Similar discussions will be included in future ASRs.

Regarding chemicals of concern (COCs), the Navy submitted on April 23, 1993, responses to comments received from the agencies on the Navy's responses to comments on the Draft OU II PHEE. These responses present a detailed assessment of several issues raised by the agencies regarding COC selection.



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Harding Lawson Associates
Engineering and Environmental Services

Conceptual Groundwater Treatment Train
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Hunters Point Annex
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FIGURE **E1**

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